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EXPLORING THE ROLES OF SERVICE SUPPLY CHAIN PERFORMANCE MEASUREMENTS IN THAI MEDICAL TOURISM INDUSTRY

Somabutr, Sutinee

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**UNIVERSITY OF
PLYMOUTH**

**EXPLORING THE ROLES OF SERVICE SUPPLY CHAIN
PERFORMANCE MEASUREMENTS IN THAI MEDICAL
TOURISM INDUSTRY**

By

SUTINEE SOMABUTR

A thesis submitted to the University of Plymouth
In partial fulfilment for the degree of

DOCTOR OF PHILOSOPHY

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Author's declaration

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award without prior agreement of the Doctoral College Quality Sub-Committee.

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Abstract

EXPLORING THE ROLES OF SERVICE SUPPLY CHAIN PERFORMANCE MEASUREMENTS IN THAI MEDICAL TOURISM INDUSTRY

Sutinee Somabutr

Medical tourism, a promising industry offering significant economic potential, particularly for Southeast Asian countries like Thailand, has generated a critical academic discourse. The medical tourism industry is complicated by its nature, combining aspects of healthcare, hospitality, and customer satisfaction within a service supply chain. A key academic challenge in this industry is the insufficient exploration and understanding of service supply chain (SSC) performance measurements. The rapid growth of the industry and the existing research gap make a detailed academic study necessary.

Addressing this challenge, this study narrows its focus on the important roles and interrelationship of SSC performance measurements within Thailand's medical tourism sector. Despite the industry's potential, there is a noticeable lack of research in this specific area, indicating a significant gap in knowledge. This study aims to fill this gap, providing the insights into the role and links between SSC performance measurements.

This research design uses three-step approach, combining theory and empirical research. Author started with a thorough literature review to frame this study and set the objectives. Author then collected empirical data through interviews with professionals from JCI-accredited healthcare providers and analyze through selected research methods.

All three phases in this study provide the current state of medical tourism, determine the importance of different SSC performance measurements, and examine the relationships between these measurements. The mixed research methods were selected to derive and interpret collected data including thematic analysis, MAXQDA2022 visualization, the Analytic Hierarchy Process (AHP), Interpretive Structural Modelling (ISM), and MICMAC analysis.

The results reveal the seven main elements and 41 sub-elements, with Customer Relationship Management being the most important, and Capacity and Resource Management being the least. These insights can help those in the medical tourism industry improve their services.

In addition to its academic contributions, this study offers practical insights by showing the differences in priorities among JCI-accredited healthcare providers. By suggesting ways to adapt SSC performance measurements to various departments within organizations. The contribution of this study can help understand changing preferences of medical tourists. This knowledge could lead to better strategies, strengthening the medical tourism industry in Thailand.

Keywords: Medical tourism, Thai medical tourism, Service supply chain management, Analytical Hierarchy Process, Performance measurement, Supply chain management

List of Abbreviations

Abbreviations	Description
AHP	Analytic Hierarchy Process
CAP*	Capacity & resource management
CAP	College of the American Pathologists
CRM	Customer relationship management
DM	Demand management
GDPR	General Data Protection Regulation
HA	Healthcare Accreditation Institute
ISM	Interpretive Structural Modelling
ITM	Information & Technology Management
JCI	Joint Commission International
MICMAC	Cross-impact matrix multiplication applied to classification
MTSC	tourism supply chain management
NESDB	The Office of the National Economic and Social Development Board, Thailand
OPM	Order process management
SEM	Structural Equation Modelling
SPM	Service performance management
SRM	Supplier relationship management
SSC	Service supply chain
SCM	supply chain management
TAT	Tourism Authority of Thailand
TSC	tourism supply chain

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Chapter 1 introduction

1.1 Introduction

This chapter commences with an overview of the thesis, providing a concise presentation of the research background focusing on the Service Supply Chain Management within the context of the medical tourism industry in Thailand. Subsequently, the research gap and scope are explained, highlighting the areas that require further investigation. The research objectives and justification are presented to provide a clear direction for this study. The research methodology is outlined, aligned the approach that will be employed to achieve the research objectives. Lastly, the structure of this thesis is clarified, providing an outline of the organization and flow of the subsequent chapters.

1.2 Background to the Research Area

In today's globalized world, people are not limited to their home country for medical treatments. This has given rise to the growing phenomenon of medical tourism (T. H. Cham, Y. M. Lim, & M. Sigala, 2021; Chaulagain, Le, & Hancer, 2023). According to (Connell, 2006, 2013), medical tourism has transitioned from being a niche market to a mainstream global industry. The expansion of this sector has been driven by factors such as high healthcare costs, extended waiting times in developed countries, the rapid advancement of medical technologies, and the availability of world-class medical facilities in developing nations (Han & Hyun, 2015; Heung, Kucukusta, & Song, 2010; Hopkins, Labonté, Runnels, & Packer, 2010). With countries investing heavily in their healthcare infrastructure to attract medical tourists, this industry has become a significant contributor to many nations' economies (Chee, 2007).

In such a global healthcare market, the role of Supply Chain Management (SCM) has become crucial. Cooper & Ellram (1993) define SCM as the integration of business processes across organizations, to provide value to the customer. The concept has been applied extensively in sectors such as manufacturing, automobile, knowledge and innovation, services, and transportation. Research by Baltacioglu (2007), Maull (2012), and Chopra (2001) demonstrate the effectiveness of SCM in improving operational efficiency, reducing costs, and enhancing the flow of information. However, the exploration of SCM's role in the domain of medical tourism, particularly from the service providers' perspective, is still limited.

This study focuses on Thailand, which has emerged as a leading destination for medical tourism. The country has used its strategic geographic location, rich cultural heritage, appealing cuisine, tourism attractions, and high-quality medical treatments to draw medical tourists. Thailand attracts over 25 million medical tourists each year (Cham, Lim, & Sigala, 2021; Lee, Lim, & Kim, 2020). Its medical tourism industry makes a significant contribution to the country's Gross Domestic Product (GDP), which was approximately 565 billion USD in 2023. According to World Bank statistical data, this makes Thailand the 25th largest world economy (WorldBank, 2022).

The Thai medical tourism industry's growing relevance has drawn interest from both academics and practitioners, leading to a surge in research on various aspects of this sector such as service quality determinants (Zolfagharian et al., 2018), decision-making motivations (Han & Hyun, 2015), and performance evaluation methodologies (Ghosh & Mandal, 2019). However, the application of SCM, the Service Supply Chain (SSC), has yet to be thoroughly addressed. The Service Supply Chain (SSC) in the Thai medical tourism industry comprises a complex network of stakeholders, including hospitals, healthcare professionals, travel agencies, accommodation providers, and insurance companies. Each player in this chain needs to work together to deliver high-quality care to international patients. Fetscherin & Stephano (2016), Han & Hyun (2015), and Lee et al. (2020) assert that the efficient management and performance evaluation of this complex supply chain are critical to maintain competitiveness and ensure service quality. Given these factors, a comprehensive examination of the role and efficiency of SCM practices in enhancing the performance of the Thai medical tourism industry is imperative.

This study will address the existing gap in the literature by exploring the role of SCM, focusing specifically on the SSC within the Thai medical tourism industry. It aims to assess the significance of performance measurements, offering valuable insights to healthcare service providers on how they can guarantee consistent service quality and high performance. The implications of this study extend beyond academic enrichment. The proposed SSC performance measurements could prove useful for policymakers, the Thai government, stakeholders, and industry practitioners in developing strategic plans for service improvements. Consequently, the research aspires to enhance the competitiveness of the Thai medical tourism industry and aid its continued growth on the global stage.

This investigation into the SSC of the Thai medical tourism industry is timely, considering the recent uptick in academic research in this sector since 2006 (Connell, 2006, 2013). It aligns with the global trend of increasing investments in healthcare services by developing countries, aiming to capitalize on the medical tourism boom to stimulate their economies (Casado-Montilla & Pulido-Fernández, 2021; Cham et al., 2021; Ghosh & Mandal, 2019; Lee, Lim, & Kim, 2020). By doing so, these countries create job opportunities, drive infrastructure development, and generate revenue not only from the healthcare sector but also from associated tourism services (Hopkins, Labonté, Runnels, & Packer, 2010). Then, the primary objective of this study is to provide a comprehensive understanding of the crucial role of SCM within the context of the Thai medical tourism industry. It seeks to promote a sustainable future for the industry by emphasizing the pivotal role of SCM in enhancing service quality and performance. It is hoped that this research will significantly contribute to reinforcing Thailand's position as a leading global destination for medical tourists, contributing significantly to the body of knowledge in this field.

1.2.1 Brief Background on the Thai Medical Tourism Industry

The Thai medical tourism industry has experienced significant growth and development in recent years, attracting a number of international patients seeking high-quality medical services at affordable prices (Xu et al., 2023). Medical tourism refers to the act of individuals traveling across borders to receive medical treatments, procedures, or surgeries. Thailand, with its well-established healthcare infrastructure, advanced medical facilities, and renowned medical professionals, has emerged as one of the leading destinations for medical tourism (J. S. Kim, Lee, & Kim, 2021; T. J. Lee, Lim, & Kim, 2020).

The evolution of the Thai medical tourism industry can be traced back to the early 2000s when the Thai government recognized the potential economic benefits and began actively promoting the country as a medical tourism hub (T. H. Cham et al., 2021; Debata, Sree, Patnaik, & Mahapatra, 2013). The combination of world-class healthcare services, competitive pricing, and attractive tourist destinations has made Thailand an appealing choice for patients seeking medical treatments abroad (Connell, 2013; Lunt, Horsfall, & Hanefeld, 2016).

As the Thai medical tourism industry has flourished, various stakeholders including hospitals, clinics, travel agencies, hotels, and transportation services have formed a complex network to cater to the needs of medical tourists (Johnston et al., 2017; Zhang & Chon, 2012). This network of interrelated entities involved in delivering healthcare services to international patients can be

conceptualized as a service supply chain. The service supply chain in the medical tourism industry involves the coordination of activities to ensure the seamless delivery of services, from the initial contact with the patient to the post-treatment follow-up (Zhang et al., 2019).

To effectively manage the service supply chain in the Thai medical tourism industry, it becomes imperative to measure and assess its performance. Performance measurements provide valuable insights into the efficiency, effectiveness, and quality of the services provided (Nguyen et al., 2018). However, the specific roles and significance of performance measurements in the context of the service supply chain in the Thai medical tourism industry remain relatively unexplored.

1.3 Problem Statement

Despite the significant growth and development of the Thai medical tourism industry, there is a lack of comprehensive understanding regarding the roles and significance of service supply chain (SSC) performance measurements. The existing literature has primarily focused on various aspects of the industry, such as service quality determinants, decision-making motivations, and performance evaluation methodologies (J. S. Kim et al., 2021; C. Lee & Spisto, 2007; T. J. Lee et al., 2020).

However, there is a limited exploration of how performance measurements can enhance the overall service quality, efficiency, and competitiveness of the Thai medical tourism industry from the perspective of the SSC (Fetscherin & Stephano, 2016).

This research aims to address this gap by investigating the roles of SSC performance measurements in the Thai medical tourism industry, thereby providing valuable insights to healthcare service providers on how they can ensure consistent service quality and high performance. The effective management of the service supply chain in the healthcare sector can lead to improved efficiency and customer satisfaction that surpasses the individual contributions of its components (Cho, Lee, Ahn, & Hwang, 2012). Within the Thai Medical Tourism industry, healthcare service providers are consistently seeking suitable performance measures to evaluate and enhance their service performance. Consequently, there arises a necessity for comprehensive service performance measurements to assess the overall effectiveness of the system.

1.4 Research Gap

While there has been a surge in research on different aspects of the Thai medical tourism industry, including service quality determinants, decision-making motivations, and performance evaluation methodologies (Baashar et al., 2020; T.-H. Cham, Y.-M. Lim, & M. Sigala, 2021; Chan & Gao, 2021; Manaf, Hussin, Kassim, Alavi, & Dahari, 2015), there is a noticeable research gap regarding the roles of SSC performance measurements. Existing studies have primarily focused on individual elements of the industry and have not comprehensively examined the overall efficiency and effectiveness of the SSC in delivering high-quality care to international patients.

Furthermore, limited attention has been given to the application of service supply chain management practices within the context of the Thai medical tourism industry. Therefore, this research aims to fill the gap by exploring the roles of SSC performance measurements and their significance in enhancing the performance of the Thai medical tourism industry.

1.5 Research Aim and Objectives

1.5.1 Research aim

The aim of this study is to *explore the roles of service supply chain performance measurements in the context of the Thai medical tourism industry*. The Thai medical tourism industry has experienced significant growth and has become a prominent destination for international patients seeking high-quality medical services. However, there is a lack of comprehensive understanding regarding the specific roles and significance of service supply chain (SSC) performance measurements in this industry.

By investigating the roles of SSC performance measurements, this study aims to fill the research gap and provide valuable insights to healthcare service providers, policymakers, and stakeholders. Understanding the specific performance metrics and indicators that drive the effectiveness and efficiency of the service supply chain can contribute to the development of targeted strategies and interventions to ensure consistent service quality and high performance. Additionally, exploring the interrelationships among performance measurements will provide a holistic view of the SSC and identify potential areas for improvement and optimization.

1.5.2 Research objectives

These research objectives are aligned with the aim of exploring the roles of service supply chain performance measurements in the Thai medical tourism industry, as well as addressing the existing research gap in this area.

The research objectives for the study are as follows:

- 1) *To identify and describe the key characteristics of the medical tourism supply chain within the context of the Thai medical tourism industry.*

This objective aims to provide a comprehensive understanding of the structure, stakeholders, and processes involved in the supply chain for medical tourism.

- 2) *To analyze the role of service supply chain (SSC) objectives in the context of the Thai medical tourism industry.*

This objective seeks to examine how the objectives of the SSC contribute to the overall functioning and performance of the medical tourism industry in Thailand.

- 3) *To establish and assess the performance measurements specifically tailored to the service supply chain in the Thai medical tourism industry.*

This objective aims to identify and develop relevant metrics and indicators that can effectively measure and evaluate the performance of the SSC in delivering high-quality care to international patients.

- 4) *To critically prioritize and determine the relative importance of the refined SSC performance measurements compared to other influencing factors.* This objective involves a comparative analysis to identify the most influential factors that significantly impact the performance of the medical tourism supply chain in Thailand.

- 5) *To evaluate the interrelationships and dependencies among the identified SSC performance measurements.*

This objective aims to examine how the different performance measurements interact and influence each other within the service supply chain, providing insights into their interdependencies and potential synergies.

6) *To propose practical guidelines and strategies for improving the performance of the medical tourism service supply chain in Thailand.*

This objective seeks to provide evidence-based recommendations and actionable insights for stakeholders, policymakers, and healthcare service providers to enhance the efficiency, effectiveness, and competitiveness of the Thai medical tourism industry.

1.6 Research Questions

What are the roles and significance of service supply chain performance measurements in improving the overall service quality, efficiency, and competitiveness of the Thai medical tourism industry?

The research question is justified by the need to understand the specific roles and significance of service supply chain (SSC) performance measurements in enhancing the overall service quality, efficiency, and competitiveness of the Thai medical tourism industry. The Thai medical tourism industry has witnessed substantial growth and has become a preferred destination for international patients seeking high-quality medical services (T.-H. Cham et al., 2021). As the industry continues to expand, it becomes imperative to identify the factors that contribute to its success and competitiveness. The service supply chain, comprising various stakeholders such as hospitals, healthcare professionals, travel agencies, accommodation providers, and insurance companies, plays a crucial role in delivering seamless and high-quality care to international patients (Debata et al., 2013; Fetscherin & Stephano, 2016).

Moreover, exploring the roles and significance of performance measurements in the service supply chain is essential for healthcare service providers, policymakers, and stakeholders. It can provide valuable insights into identifying areas of improvement, optimizing processes, and developing strategies to ensure consistent service quality and high performance (Cho et al., 2012). By addressing these aspects, the study aims to contribute to the body of knowledge in the field and provide practical recommendations for enhancing the performance and sustainability of the Thai medical tourism industry. Therefore, the research question aligns with the need to gain a comprehensive understanding of the roles and significance of service supply chain performance measurements in improving the overall service quality, efficiency, and competitiveness of the Thai medical tourism industry.

1.7 Significance of the Study

The significance of this study lies in the recognition of the importance of the medical tourism supply chain perspective and the need to address the gap in theoretical implications within this context. Through a comprehensive literature review, it is evident that measurements and metrics specific to the medical tourism supply chain are limited and underexplored (Baltacioglu et al., 2007; Ellram, Tate, & Billington, 2004; Maull, Geraldi, & Johnston, 2012; Sampson & Spring, 2012a, 2012b).

By initiating and discussing performance measurements for the medical tourism supply chain, this research fills the void in understanding the unique characteristics and complexities of this industry. The proposed performance measurements serve as guidelines for healthcare managers and administrators to comprehend the dimensions that medical tourists consider when evaluating the service delivery process in medical tourism.

These measurements are essential because medical tourists prioritize choosing appropriate service providers by assessing the destination, healthcare delivery, and treatment value. Hence, the conceptual framework developed in this research provides insights into the assessment of service performance in the medical tourism supply chain perspective (Baltacioglu et al., 2007; Ellram, Tate, & Billington, 2004; Maull, Geraldi, & Johnston, 2012; Sampson & Spring, 2012a, 2012b).

Practitioners in the medical tourism industry, including service supply chain managers in healthcare and tourism sectors, can benefit from this research. It offers a different perspective on evaluating supply chain performance compared to the assessment methods used in manufacturing supply chains. Additionally, healthcare supply chain managers gain valuable knowledge about medical tourists' perceptions of service quality dimensions in the medical tourism industry.

The explored service supply chain management performance measurements presented in this study can be utilized by service providers to position themselves as attractive and preferred medical tourism destinations. These measurements allow providers to showcase their range of healthcare facilities, infrastructure details, safety aspects, quality control measures, and the rich heritage of their country, thereby enhancing the confidence of medical tourists (Baltacioglu et al., 2007; Ellram, Tate, & Billington, 2004; Maull, Geraldi, & Johnston, 2012; Sampson & Spring, 2012a, 2012b).

1.8 Thesis Outline

Chapter One: Introduction

The first chapter of this thesis begins with an introduction, providing the research background and the motivation for conducting this study. The scope of the study is then outlined, followed by the research questions and objectives. The significance of the study and its key contributions are presented to highlight the importance and potential impact of the research. Finally, the structure of the thesis is explained, giving an overview of the chapters that will be covered.

Chapter Two: Literature Review

The second chapter presents a comprehensive literature review, which was conducted using a systematic literature review approach. This review provides an extensive overview of the existing literature on medical tourism, including the background of medical tourism in Thailand, the context of service supply chain, and service supply chain performance measurements. The research gap is identified based on the findings of the literature review, highlighting the need for further research in this area.

Chapter Three: Theoretical Foundation and Framework Development

Chapter three focuses on establishing the theoretical foundation and developing a conceptual framework for the study. Theoretical development is discussed, including the application of system theory and Unified Service Theory (UST) to the context of the medical tourism industry. These theories provide a solid basis for understanding the complexities and interdependencies within the service supply chain. The proposed conceptual framework integrates these theories to guide the assessment of service performance in the medical tourism supply chain.

Chapter Four: Research Methodology

Chapter four presents the research methodology used in this study. It explains the research philosophy, approach, and provides details on data collection and analysis methods. The overall research design is justified based on the selected approach and research philosophy. A mixed-methods approach is employed, and specific methods are derived for each phase of the study. Research ethics are also discussed in this chapter.

Chapter Five: Exploratory Study (Phase One)

Chapter five describes the exploratory study, also known as phase one of the research. It discusses the sampling recruitment approach and highlights the inclusion criteria for selecting participants. The chapter explains the use of a pilot study and the adoption of semi-structured interviews to collect primary data from JCI accredited healthcare service providers in Thailand. Thematic analysis and MAXQDA 2022, a qualitative analysis software, are utilized to visualize the framework of the tourism supply chain and develop potential service supply chain (SSC) performance measurements.

Chapter Six: study phase two and study phase three

Chapter six focuses on the quantitative analysis phase of the study. It describes the administration of AHP sequential questionnaires to the same sample as in phase one. The Analytical Hierarchy Process (AHP) technique is used as the main tool to analyze the results of SSC performance measurements prioritization. The chapter discusses the ranking of the 41 refined SSC performance measurements, differentiating each SSC dimension. Primary data is also collected through semi-structured interviews with the same sample. Then, study phase three presents the building of interrelationships among the top ten refined SSC performance measurements using Interpretive Structural Modeling (ISM). The MICMAC analysis is introduced to analyze the interrelationship and visualize the groups of SSC performance measurements.

Chapter Seven: Discussion and Conclusion

This chapter presents the discussion of empirical findings from phase one to phase three, examining the similarities and differences between the obtained empirical findings and the existing literature review. The chapter concludes the thesis by summarizing the findings from each study phase. The theoretical contributions and practical implications are also discussed, along with the limitations of the study and directions for future research.

Chapter Eight: Conclusion

This chapter serves as the conclusion of the thesis, summarizing how the research has met the aims and objectives set out at the beginning of the study.

1.9 Summary

The introduction chapter of this thesis provides a comprehensive overview of the research area, starting with the background to the research. It highlights the significance of studying service supply chain performance measurements in the context of the Thai medical tourism industry. The chapter begins by providing a brief background on the Thai Medical Tourism industry, emphasizing its growth and importance in the global healthcare market. It also highlights the unique characteristics and complexities of the industry, underscoring the need for effective supply chain management.

The problem statement is then presented, focusing on the limited understanding and research gap regarding service supply chain performance measurements in the medical tourism industry. The need for a deeper exploration of this area is highlighted, as it can contribute to the enhancement of service delivery and patient satisfaction. Following the problem statement, the research aims, and objectives are clearly stated. The aim of the study is to explore the roles of service supply chain performance measurements in the Thai medical tourism industry. The objectives are outlined, providing a clear roadmap for the research.

To guide the study, several research questions are formulated. These questions address various aspects of the research, such as the characteristics of the medical tourism supply chain, the role of service supply chain management, and the development of performance measurements. The significance of the study is then discussed, emphasizing its potential contributions to both theory and practice. The findings of this research can provide insights and guidelines for healthcare managers and administrators in optimizing their supply chain processes and enhancing the overall service delivery to medical tourists. To provide a clear structure for the thesis, an outline of the subsequent chapters is presented. Each chapter is briefly described, highlighting the specific topics and methodologies that will be covered.

To sum up, the introduction chapter sets the stage for the research, highlighting the background, problem statement, research gap, aim, objectives, research questions, significance, and thesis outline. It provides a comprehensive overview of the research area, paving the way for the subsequent chapters to delve deeper into the study's objectives and contribute to the existing knowledge in the field of service supply chain performance measurements in the Thai medical tourism industry.

Chapter 2 Literature review

2.1 Introduction

This section addresses the various definition of medical tourism, the attributes of medical tourism industry, the categories of medical tourists, and the globalization of medical tourism industry. Then, it discusses about Thailand medical tourism industry which expresses as one of the top medical hubs of Asia. It is crucial to have a better understanding of medical tourism's nature to adapt with service supply chain management context.

2.2 The 'Medical Tourism' in general

The author has conducted a review of current research on supply chain management (SCM) within the context of medical tourism to clarify the definition of medical tourism. It is important to understand the terminology related to medical tourism, including the differences between tourism supply chain (TSC), healthcare supply chain, and medical tourism supply chain management (MTSCM).

The concept of *Tourism supply chain* involves collaboration among various entities such as attraction providers, hospitality suppliers, transportation providers, travel agencies, public sectors, souvenir shops, and local shops. These entities work together to supply goods and services to visitors (Hu, Peng, Zhang, & Yu, 2020).

On the other hand, *Healthcare supply chain* refers to the flow of medical products and services from manufacturers to the final point of consumption, which is the patients. This flow may involve intermediaries like physicians or nurses (Lapointe, 2016).

Medical tourism supply chain (MTSCM) has its own distinct definition. Researchers such as Connell (2006), Heung et al. (2010) and Carrera and Lunt (2010) have emphasized that MTSCM involves a person traveling across borders to obtain medical treatment and engaging in relaxation activities or taking a holiday in a foreign country during the recuperation period.

Therefore, it is important to differentiate between these various definitions to have a clear understanding of medical tourism and its specific supply chain management practices.

2.3 The definition of medical tourism

The definitions of medical tourism vary widely, with no consensus on an exact definition (Chia & Liao, 2021; Connell, 2006, 2013; Debata et al., 2013; Ferrer & Medhekar, 2012; Fetscherin & Stephano, 2016). Medical tourism often overlaps with health and wellness tourism and healthcare supply chain, but it is characterized by travel across borders and the involvement of invasive medical treatments, distinguishing it from non-invasive treatments in health and wellness tourism such as spa, yoga, and meditation (Connell, 2013).

Scholars have recognized health tourism, wellness tourism, and medical tourism as integrated phenomena with distinct focuses. For example, Connell (2006) defines health tourism as "the organized travel outside one's local environment for the maintenance, enhancement, or restoration of an individual's well-being in mind and body." Medical tourism definition from Connell (2013) also narrows down this definition to "organized travel outside one's natural health care jurisdiction for the enhancement or restoration of the individual's health through medical intervention"

The literature review aims to identify the various definitions of medical tourism, which are described using different terms but share a common direction. Medical tourism has garnered significant interest from both scholars and practitioners in recent decades. Existing literature presents diverse perspectives on medical tourism, seeking to establish the connection between medical treatment services and tourism experiences.

Some influential studies have shed light on medical tourism as a niche phenomenon. Connell (2013) identifies it as a new niche where individuals travel long distances to overseas countries to seek medical, surgical, and dental care while combining it with conventional holiday activities. Lunt and Carrera (2010) emphasize that medical tourism involves individuals choosing to travel across borders to receive treatment. Bookman (2007) defines medical tourism as "an economic activity that entails trade in services and represents the splicing of at least two sectors: medicine and tourism."

Throughout numerous studies, medical tourism has been described using different terminologies. Regarding medical tourism, heterogeneous definitions have been presented, as shown in Table 1 (Connell, 2013; Lunt & Carrera, 2010; Bookman, 2007).

In Table 1, different definitions of medical tourism are selected from international peer-reviewed journals that align with the common direction of this study (Touboulis & Walker, 2015). These definitions have been chosen to ensure a certain level of quality and to provide a robust foundation for establishing the research framework. Additionally, the inclusion of papers that

align with the direction of this study from international peer-reviewed journals adds credibility and relevance to the definitions used in this research.

Table 1 summarizes the definitions and contents of each paper. In this section, a comprehensive understanding of the vary medical tourism definitions were conducted and drawn author's attention to establish her own definition and theoretical framework.

According to Seuring and Muller (2008), various research methodologies were employed to classify papers, including theoretical and conceptual papers, case studies/interviews, surveys, modelling papers, and literature reviews. By analysing the summaries of these studies, several research gaps can be identified.

- To the best of the author's understanding, there is currently no universally accepted definition of medical tourism. Consequently, there exists an explicit need for further exploration and research in the field of medical tourism to establish a widely agreed-upon definition.
- Secondly, there is a noticeable lack of empirical research, particularly within the context of Thailand. Since the early 2000s, a substantial increase in medical tourism literature reviews has been observed, primarily focusing on developing countries. However, there is limited exploration into how performance metrics can augment service quality, efficiency, and competitiveness in Thailand's medical tourism sector, particularly from the viewpoint of the supply-side chain (SSC) (Fetscherin & Stephano, 2016). Thus, the research results indicate a clear definition, and the empirical research are conducted.

Table 1 Typology definitions for medical tourism

Author (s) (year)	Definition	Research methods	Theoretical/Empirical
Bookman (2007)	An economic activity that entails trade in services and represents the splicing of at least two sectors: medical and tourism.	Theoretical/conceptual paper	theoretical
Connell (2006)	Medical tourism as a niche has emerged from the rapid growth of what has happened in this industry, where people travel long distances to overseas countries to obtain, medical surgical and dental treatment.	Theoretical/conceptual paper	theoretical
Jagyasi (2010)	Set of activities in which a person travels often long distances or across the border, to avail medical services with direct or indirect engagement in leisure, business, or other purpose.	Literature review	theoretical
Lunt and Carrera (2010)	Medical tourism, whereby tourists prefer to travel across borders or to overseas destination to obtain their treatment.	Literature review	theoretical
Carrera and Lunt (2010)	Medical tourism is subset of health tourism. Medical is delimited to “organized traveled outside one’s natural healthcare jurisdiction for the enhancement or restoration of the individual’s health through medical intervention”.	Literature review	theoretical
Yu & Ko (2012)	Medical tourism is an integration of medical service and tourism industry.	Literature review	theoretical
Edelheit (2008)	Medical tourism defines as patients elect to travel overseas countries for affordable care, high quality and accessible.	modelling papers	theoretical
Cohen (2008)	Medical tourism is the narrow sense which is expanded into the wider field of health tourism.	Theoretical/conceptual paper	theoretical
Hopkins et al. (2010)	Medical tourism is about an emerging manifestation of globalization of health care. Medical tourism refers to overseas health care with the lower cost, keeping away from long waiting time or medical service not available in patient’s country.	Literature review	theoretical
Heung et al. (2010)	A vacation which includes travelling across borders to receive a broad range of medical service. It usually combines fun, leisure and relaxation as well as wellness and healthcare service.	case studies	theoretical
Johnston, Crooks, Snyder, and Kingsbury (2010)	Patients depart from their home countries outside of established across border care arrangements made with the accessing medical care, general surgery abroad.	case studies	theoretical
Cormany and Baloglu (2011)	Medical tourism is “The act of travelling abroad to obtain medical care”.	Theoretical/conceptual paper	theoretical

2.4 The attributes of medical tourism

Medical tourism is a multi-faceted industry with several key elements contributing to its structure and function (Debata et al., 2013). These elements include the diverse categories of medical tourists, the role of medical tourism facilitators, the contribution of tour operators and travel agents, the pivotal involvement of healthcare service providers, the influence and regulatory oversight of government agencies, and the importance of international accreditations such as those from the Joint Commission International accreditation (Bookman, 2007; Debata et al., 2013; Fetscherin & Stephano, 2016; Kaewkitipong, 2018) . Each of these attributes plays a unique and integral role in shaping the global landscape of medical tourism.

2.4.1 The categories of medical tourists

It is observed that tourists seeking medical treatments abroad often have different motivations, and many of them prefer to have companions during their travels, such as friends or family members (Ahani et al., 2021; Aziz, Abdullah, Rozman Md Yusof, Wahid, & Hamzah, 2021; T. H. Cham et al., 2021; Chaulagain et al., 2023).

Scholars have provided definitions of medical tourists based on previous studies. For example, Whittaker, Manderson, and Cartwright (2010) describe medical tourists as individuals who receive medical care while on holiday, as long as the treatment and recovery period does not exceed the duration of their holiday and remains affordable. Chee (2007) introduces the concept of "planned medical tourists," referring to individuals who have organized their medical trips in advance before traveling overseas.

Mere Tourist	Medicated Tourist	Medical Tourist proper	Vacationing Tourist	Mere Patients
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Figure 1 A typology of medical tourists

In Figure 1, Cohen (2008) has developed a typology of medical tourists to provide clarity and avoid confusion by considering the level of motivations and the role of medical treatment during the trip. This typology categorizes medical tourists into five distinct categories:

- I. *Mere Tourist*: This category refers to individuals who do not seek any medical treatment while on holiday in the host country.

- II. *Medicated Tourist*: This category includes individuals who receive emergency medical treatment for health problems that arise while they are in the host country.
- III. *Medical Tourist Proper*: These are individuals who plan both their tourism activities and medical treatment in advance in their home country but make decisions regarding treatment while vacationing in the host country.
- IV. *Vacationing Patient*: This category involves individuals who primarily visit an overseas country to seek medical care but may take advantage of vacation opportunities during the recuperation period.
- V. *Mere Patient*: This category comprises individuals who travel to the host country with the sole intention of obtaining medical treatment.

Additionally, scholars such as Lunt and Carrera (2010) have also studied patient mobility and identified five categories of patient mobility in Europe. These categories can be adapted to target specific characteristics of medical tourists and include temporary visitors abroad, long-term residents, common-borders patients, outsourced patients, and medical tourists.

2.4.2 Role of Medical Tourism Facilitators

Facilitators are the bridge connecting medical tourists with healthcare providers (T.-H. Cham et al., 2021; Chia & Liao, 2021). They handle a multitude of tasks, from offering consultation on medical services, arranging travel and transportation, to providing support systems to ensure a seamless experience for the medical tourists (Heung et al., 2010; IMTJ, 2021; Jagyasi, 2010). They are an important pillar in the medical tourism ecosystem and have become increasingly crucial as medical tourism has grown in complexity and scope (Whittaker et al., 2010). Facilitators use their expertise and connections to guide medical tourists, navigating the complexities of international healthcare systems, ensuring appropriate treatment options, and recommending ideal destinations (Cormany & Baloglu, 2011). This could include identifying the right country, liaising with local facilitators, and finding suitable medical options from healthcare providers. They may also manage travel packages for the post-treatment recovery phase, thus ensuring a holistic care experience for the patient (Chaulagain et al., 2023; Chia & Liao, 2021).

2.4.3 Tour Operators and Travel Agents in Medical Tourism

Tour operators and travel agents play distinct, yet interconnected roles in the medical tourism industry. Tour operators manage the logistics of tourist vacations, handling bookings, contracts, and creating package deals that can include accommodation, meals, transportation,

local tours, and flight arrangements. Their responsibility usually begins when the tourist arrives in the destination country (The Specialist Travel Association, 2018; Moss, 2019). Travel agents, on the other hand, act as intermediaries between tourists and tour operators. They work with multiple tour operators to provide a variety of travel packages to customers. Their role involves sales and customer service, aligning travel packages with the specific requests and budgets of tourists (The Specialist Travel Association, 2018; Moss, 2019).

2.4.4 Healthcare Service Providers/Hospitals

Healthcare service providers form the backbone of the medical tourism industry as they offer the much-needed medical services that medical tourists seek (Ko, 2011). They range from small, specialized clinics to large private hospitals and hospital chains. Small clinics offer a range of specific treatments, such as cosmetic surgery and LASIK treatment, while large hospitals, like Bumrungrad in Thailand, Yonsei Severance in South Korea, Raffles in Singapore, Apollo in India, and Prince Court Medical Center in Malaysia, offer a wide variety of medical services (Lunt et al., 2011; Cohen, 2009; Ko, 2011). These providers often work closely with medical tourism facilitators, tour operators, and travel agents to ensure their services align with the needs and cultural preferences of international patients.

2.4.5 Government's Role in Medical Tourism

Governments play a crucial role in shaping the landscape of the medical tourism industry. They develop and implement strategic policies to promote medical tourism, aligning it with national economic interests and healthcare goals (Lunt et al., 2015). They undertake initiatives to boost the industry's growth, identifying economic opportunities within the healthcare and tourism sectors, and providing infrastructural and policy support to private healthcare providers (Lunt et al., 2015; Ko, 2011; Lunt et al., 2011). Many Southeast Asian governments, such as those in Thailand, India, Singapore, and Malaysia, have proactively promoted their countries as premier medical tourism destinations, leveraging international press, official support activities, and streamlined visa processes for medical tourists (Lunt et al., 2015). Through these initiatives, governments aim to stimulate economic growth, generate employment, and enhance their international healthcare reputation.

2.4.6 Joint Commission International (JCI) and its Role in Medical Tourism

Joint Commission International (JCI) is a U.S.-based organization that offers accreditation to healthcare organizations globally (Joint Commission International, 2021; Woodhead, 2013). The JCI accreditation is considered the gold standard in global health care. It signifies that a healthcare institution has met stringent international standards in quality and patient safety. For medical tourists, a JCI accreditation can be a significant factor in deciding where to seek medical treatment abroad. The JCI accreditation ensures a baseline of quality and safety, providing reassurance to international patients that they will receive high-quality care (Joint Commission International, 2021).

The JCI accreditation provides medical tourists with an additional level of confidence in the healthcare services they are seeking abroad. It offers a reliable means of assessing the quality of healthcare institutions, aiding medical tourists in making informed decisions about where to seek treatment (Greenfield & Pawsey, 2013). For hospitals and healthcare providers, gaining a JCI accreditation can be a significant advantage, particularly in attracting medical tourists. As the demand for medical tourism grows, healthcare providers increasingly seek JCI accreditation to distinguish themselves from their competitors. It not only increases their credibility but also potentially boosts their reputation on the international stage, attracting more international patients (Alkhenizan & Shaw, 2011).

In summary, JCI plays a pivotal role in the medical tourism industry, helping standardize and ensure the quality of care provided to patients worldwide, improving the services offered by healthcare institutions, and providing medical tourists with a reliable gauge of healthcare quality.

2.5 The Globalization of medical tourism industry

In an increasingly globalized world, medical tourism has experienced substantial growth (Chaulagain et al., 2023). The simplicity of international travel and advancements in communication technology have made it possible for patients to seek and receive medical care from anywhere in the world (Fetscherin & Stephano, 2016; Fujita & Sato, 2022).

Patients are often enticed by the prospect of accessing more affordable healthcare services, from procedures to treatments and medications, without having to compromise on the quality of care (T. H. Cham et al., 2021). This cost-effectiveness is particularly evident in popular medical tourism services like cosmetic surgery, dental work, cardiovascular procedures, orthopedic treatments, and cancer therapies (Carrera & Lunt, 2010; Debata et al., 2013). Many patients are

attracted to medical tourism due to the potential for lower-cost procedures, treatments, or medications, without sacrificing the quality of care (Taneja & Sushil, 2007; Wongkit & McKercher, 2013; Zarei & Maleki, 2019). Some of the most sought-after medical treatments include cosmetic surgery, dental work, cardiovascular surgery, orthopedics, and cancer treatments (India Tourism Report, 2010, as cited in Wang, 2010).

The standard of healthcare and hospital accreditation has become a pivotal factor in patients' decisions regarding medical tourism. Hospitals that uphold international standards and have a reputation for delivering high-quality healthcare services tend to attract more medical tourists (Cormany & Baloglu, 2011; Debata et al., 2013). The rise of healthcare globalization, ease of international travel, and improved communication technologies have facilitated the expansion of medical tourism (Connell, 2006; Wang, 2012). There is also a trend of hospitals specializing in certain treatments or procedures. These specialty centers often provide comprehensive package deals that include not only the medical treatment but also accommodation and often some form of touristic experience (Aziz et al., 2021; Chia & Liao, 2021). There is an increasing emphasis on a comprehensive and personalized patient experience, encompassing the entire medical tourism journey, from the initial consultation and treatment to aftercare and recovery (Hopkins et al., 2010).

Technology and innovation have significantly contributed to the expansion of the medical tourism industry (Baashar et al., 2020). Hospitals specializing in certain treatments or procedures often provide package deals that include treatment, accommodation, and sometimes even touristic experiences (Hunter-Jones, Sudbury-Riley, & Al-Abdin, 2022). Advancements in medical technologies such as telemedicine, artificial intelligence, and virtual reality have facilitated effective communication between patients and doctors, regardless of geographical distance, both before and after treatment (Ahani et al., 2021; Taneja & Sushil, 2007). The rise of medical technologies, such as telemedicine, AI, and virtual reality, has been crucial in medical tourism's expansion. These technologies allow for effective patient-doctor communication before and after treatment, irrespective of geographical distance (Fetscherin & Stephano, 2016).

Governments worldwide have recognized the economic potential of medical tourism (Han & Hyun, 2015). They are increasingly offering incentives and devising policies aimed at attracting medical tourists. These measures can range from simplified visa processes for medical tourists to substantial investment in cutting-edge medical facilities (Johnston, Crooks, Snyder, & Kingsbury, 2010; Kaewkitipong, 2018). Governments have acknowledged the economic potential of medical

tourism and are implementing policies and incentives to attract medical tourists, including streamlined visa processes and investments in advanced medical facilities (Ho, Feng, & Yen, 2015; S. Kim, Arcodia, & Kim, 2019).

As the global competition intensifies, numerous nations including Costa Rica, Singapore, Turkey, India, Malaysia, South Korea, Latvia, Lithuania, and Thailand are striving to establish themselves as premier destinations for medical tourism (H. Y. Wang, 2012). Specifically, Southeast Asia has seen a significant surge in medical tourism (J.-H. Wang, Feng, & Wu, 2020).

India, for example, has emerged as a dominant force in the industry. Its lower treatment costs, sometimes hundreds of thousands of dollars less than the United States, make it an attractive choice for international patients (Ajmera & Jain, 2019a, 2019b). India further differentiates itself as a global hub for medical tourism by offering a variety of treatments, from alternative therapies like Ayurveda to more conventional surgeries (Wang, 2012).

Similarly, Singapore has earned a reputation as a major player in the medical tourism industry, competing directly with Thailand. Almost all Singaporean hospitals participate in the medical tourism program, with many achieving JCI and other international accreditations (Aziz et al., 2021; Bookman, 2007; Chee, 2007).

Meanwhile, the Malaysian government is actively promoting its medical tourism industry, building its reputation and popularity based on service excellence and advanced healthcare facilities (Debata et al., 2013; Fetscherin & Stephano, 2016; Lunt & Carrera, 2010). This effort mirrors a global trend as countries increasingly recognize the potential of medical tourism to generate revenue not only in healthcare, but also in sectors like transport, tourism, services, and infrastructure construction (Lunt & Carrera, 2010; Fetscherin & Stephano, 2016).

Thailand has also emerged as a significant player in the medical tourism industry, drawing attention to its high-quality healthcare services, favorable geographical location, and the warmth of Thai hospitality (Chaulagain et al., 2023). As one of the early entrants into the field, Thailand has capitalized on its existing robust tourism industry to attract medical tourists from around the world. Healthcare providers in Thailand are recognized for their high standards, with numerous hospitals earning Joint Commission International (JCI) accreditation (Woodhead, 2013). Moreover, the hospitals offer a comprehensive range of medical services, from traditional procedures to alternative treatments, catering to a broad spectrum of patient needs (Baashar et al., 2020).

In conclusion, the rise of medical tourism underscores the growing interconnectedness of global healthcare and economic trends (Lunt et al., 2016; Manaf et al., 2015). With countries like Costa Rica, Singapore, Turkey, India, Malaysia, South Korea, Latvia, Lithuania, and Thailand capitalizing on their strengths to attract international patients, it is clear that medical tourism is not only a driver of healthcare access and affordability, but also a significant contributor to the broader economic development of these nations. Underpinned by advancements in communication technology, government support, and the relentless pursuit of service excellence and patient-centered care, the growth of medical tourism promises new opportunities and challenges (Han & Hyun, 2015). As this dynamic sector continues to evolve, further exploration and understanding of its complexities will be paramount in shaping sustainable and equitable global healthcare solutions (T. H. Cham et al., 2021; Ho et al., 2015; Manaf et al., 2015).

2.5 Thailand: Medical tourism hub of Asia

Thailand has steadily grown as a key player in the medical tourism industry, distinguishing itself through high-quality healthcare services, strategic geographic positioning, and the intrinsic allure of Thai hospitality (Thailand Medical Intelligence Center, 2019). As an early participant in this field, Thailand has adeptly leveraged its vibrant tourism sector to attract medical tourists globally (Somabutr, Pandian, & Roh, 2022). Thailand consistently adheres to rigorous standards, as evidenced by the multiple hospitals that have received Joint Commission International (JCI) accreditation (BOI, 2020; Fujita & Sato, 2022; Joint Commission International, 2021). Moreover, these facilities offer a comprehensive range of medical services, extending from traditional procedures to alternative treatments, thus catering to a diverse array of patient needs (T. H. Cham et al., 2021). On the affordability scale, Thailand presents a compelling proposition (Lovelock, Lovelock, & Lyons, 2018). Compared to Western countries, medical treatments in Thailand are significantly lower, thereby attracting those seeking quality medical care without a hefty price tag (Z. Liu, Wang, Weber, Chan, & Shi, 2022).

The Thai government has been instrumental in fostering the medical tourism industry, identifying it as a linchpin for national economic growth (Altin, Koseoglu, Yu, & Riasi, 2018). In this vein, the government has introduced policies and initiatives to facilitate the establishment of advanced medical facilities, simplify visa processes for medical tourists, and augment the overall patient experience (Cormany & Baloglu, 2011; Fujita & Sato, 2022). Additionally, the synergy

between Thailand's flourishing tourism sector and its medical tourism industry cannot be overlooked. The stunning landscapes, rich cultural history, and world-renowned Thai hospitality significantly bolster Thailand's appeal as a preferred medical tourism destination (Phoonphongphiphat, 2021)

These elements of Thailand's medical tourism growth encapsulate global trends including the impacts of globalization and accessibility, the balancing act of cost and quality of care, adherence to international healthcare standards, the provision of specialized treatments, the role of technological advancements, active government participation, and the importance of patient-centered care. Consequently, Thailand offers invaluable insights into the workings and potential of medical tourism within the global healthcare sphere (Debata et al., 2013).

Underpinning Thailand's strong reputation and global image is the concerted effort to establish the country as the premier medical hub of Asia (Wongkit & McKercher, 2013). This involves delivering comprehensive medical treatment services, employing highly skilled healthcare specialists, and attaining international accreditations. According to the Board of Investment (2020), the Thai government has strategically executed a 10-year plan named "Thailand, a Hub of Wellness and Medical Services," as part of its Twelfth National Economic and Social Development plan. This strategy leverages Thailand's reputation and competitive pricing to develop the country into a medical hub spanning four sectors: medical services, wellness, health products, and academic medical centers (Thailand Board of Investment BOI, 2020).

With an annual influx of over a million international medical tourists, the Thai medical tourism industry showcases robust growth, supported by world-class specialists and cutting-edge facilities. As reported by the Thailand Board of Investment (2017), Thailand is among the pioneers in Asia with 4 facilities receiving Advanced Healthcare Accreditation (HA) and more than 50 hospitals gaining JCI accreditation (Fetscherin & Stephano, 2016; Ghosh & Mandal, 2019; Ho et al., 2015). According to data from the Medical Tourism Association, the most sought-after medical procedures in Thailand span a broad spectrum, reflecting the country's wide-ranging healthcare capabilities (Joint Commission International, 2021). Figure 2 presents the different invasive and non-invasive treatments that international patients opt for when seeking healthcare in Thailand. The three most popular treatments are in the fields of orthopaedics, cancer, and cosmetic surgery, according to the Medical Tourism Association (2017).

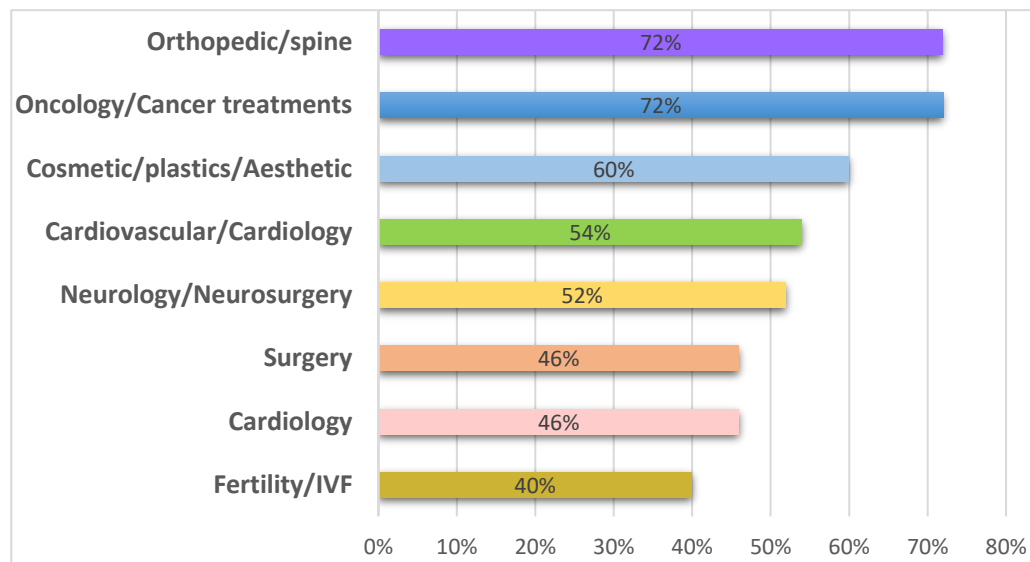


Figure 2 The popularity of medical procedure type in Thailand (Medical Tourism Association, 2017)

Thailand leads the medical tourism industry, attracting over 2.5 million international patients annually (Thailand Board of Investment, 2014). Thanks to its cutting-edge medical technology, superior healthcare service, and competitive pricing, Thailand has emerged as Asia's healthcare hub. It's recognized as a preferred destination for advanced medical technologies and private hospitals in Southeast Asia (Heung, 2011). In 2014, Thailand boasted more JCI accreditations than any other Asian country, reinforcing its standing as a premier medical tourism destination (Patients Beyond Borders, 2014). The range of medical treatments offered in Thailand spans from general check-ups and dentistry to complex procedures like hip replacements, heart surgeries, and Laser eye surgeries. To overcome language barriers, many hospitals provide interpreters fluent in various languages (Lunt et al., 2015; Ko, 2011). The most frequented hospitals are usually situated near tourist hotspots, such as Bangkok, Chonburi, Phuket, Chiang Mai, and Krabi (Kaewkitipong, 2018).

Bumrungrad International Hospital, for instance, was the first Southeast Asian hospital to receive Joint Commission International (JCI) accreditation in 2002 and is one of the region's largest private hospitals (Pattharapinyophong, 2019; Ushakov, 2021). It is well-known for

offering state-of-the-art medical facilities and quality clinical treatments. The hospital caters to the diverse needs of medical tourists by providing interpreters for specific groups such as Japanese, Chinese, and Middle Eastern patients (Association, 2021; Ushakov, 2021).

The Bangkok Hospital Group, another leading private hospital in Thailand, operates 40 branches throughout the country. It offers translation services in over 26 languages and provides high-quality medical facilities and services. The hospital serves around 230,000 international patients from more than 160 countries each year (Bangkok Hospital, 2019).

2.6 Key Success Factors for Medical Tourism

With patients' demands and preferences evolving, understanding the challenges and opportunities in both the healthcare and tourism industries becomes essential. These two industries are significant components of the service sector in nearly every country. The rise of the medical tourism industry can be attributed to a host of factors. Credible accreditation of healthcare providers and affordable healthcare costs play a substantial role in escalating the patient's interest in such services. As shown in Figure 3, these are amongst the primary reasons why people are drawn to medical tourism.

Table 2 provides information on JCI-accredited hospitals across Thailand, to further assure potential medical tourists of the internationally recognized standards maintained in these facilities (Henson, 2019; Woodhead, 2013).

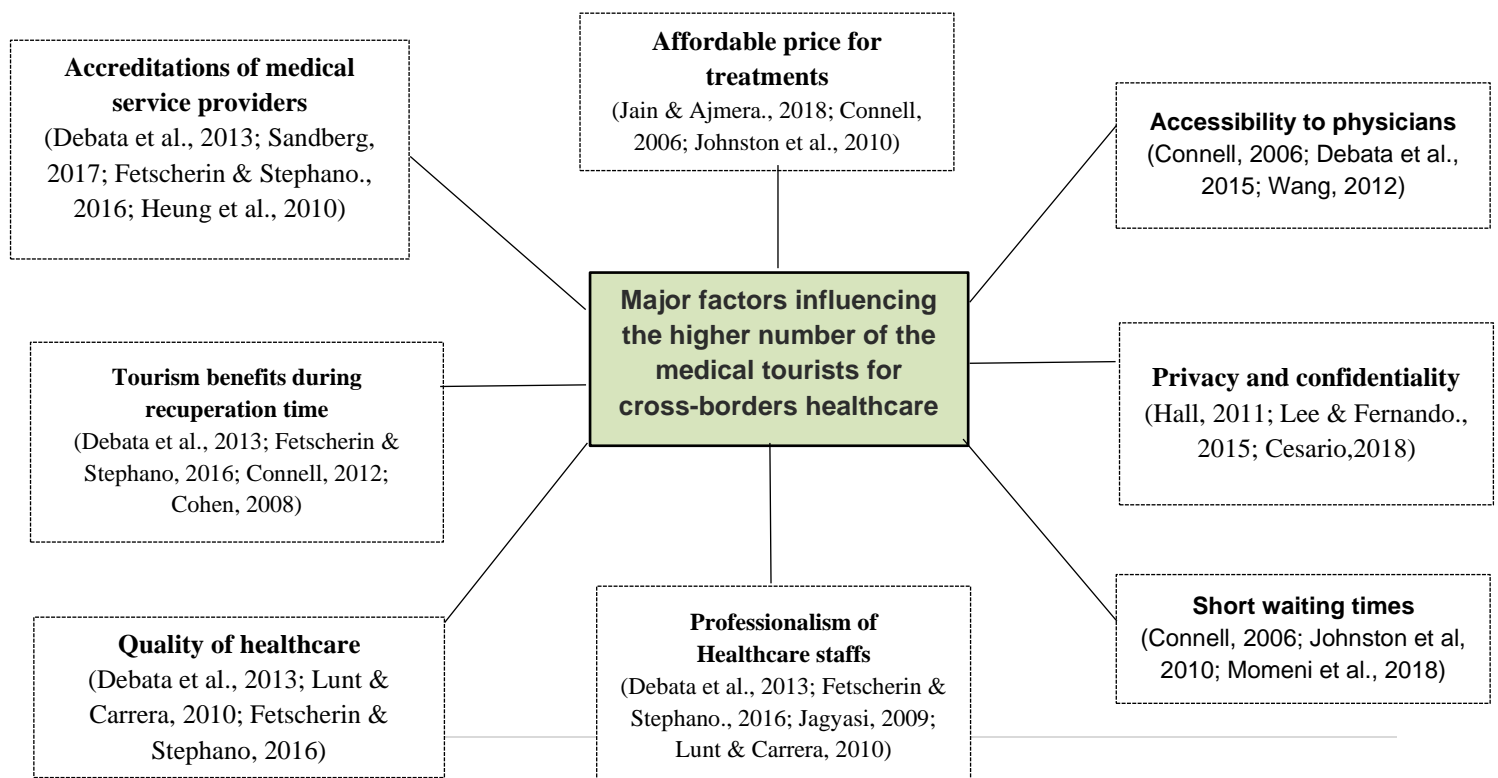


Figure 3 Key success factors for medical tourism

Table 2 JCI accredited Hospitals in Thailand

No.	Hospital	Location	Hospital Programme	Non-Hospital Programme		Achieved Accreditation Date
				Ambulatory Care	Other	
1	Aek Udon International hospital	Udonthani	24-Jan-15			
2	Aikchol Hospital	Chonburi	31-Oct-15		Acute Myocardial Infraction (AMI)	27-Sep-18
3	Apex Medical center	Bangkok		24-Feb-18		
4	Asia Cosmetic Hospital Co., Ltd	Nonthaburi		24-Sep-16		
5	Bangkok Hospital Chiang Mai	Chaing Mai	29-Aug-15			
6	Bangkok Hospital Chinatown	Samphanthawong, Bangkok	05-Nov-15			
7	Bangkok Hospital Headquarters	Bangkok	30-Jun-07		Acute Myocardial Infraction (AMI)	30-Oct-08
					Primary Stroke	31-Oct-08
					Breast cancer	1-Nov-08
					Diabetes Type II	1-Dec-11
					Heart failure	29-Oct-08
					Low back pain	2-Dec-11
					Traumatic Brain Injury	27-Nov-13
					Knee Replacement	10-Feb-18
8	Bangkok Hospital Hua Hin	Prachuapkhirikhan	21-Jan-12			
9	Bangkok Hospital Pattaya	Chonburi	19-Sep-09		Primary Stroke	26-Sep-18
					Acute Coronary Syndrome	28-Sep-18
10	Bangkok Hospital Phuket	Phuket	23-May-03			
11	Bangkok Hospital Samui	Samui Island	20-Oct-12			
12	Bangkok International Dental Center	Bangkok		08-Nov-12		
13	Bangkok Rayong Hospital Co., Ltd	Bangkok	23-Nov-18			
14	Bangpakok 9 International Hospital	Bangkok	01-Nov-13			

Table 2 JCI accredited Hospitals in Thailand (Cont)

No.	Hospital	Location	Hospital Programme	Non-Hospital Programme		Achieved Accreditation Date
15	BB Clinic	Bangkok		30-Sep-17		
16	BNH Hospital	Bangkok	29-May-09			
17	Bumrungrad Hospital Public Co., Ltd	Bangkok	02-Feb-02			
18	Chaophya Hospital Public Co., Ltd	Bangkok	17-Mar-12			
19	Chiangmai Ram Hospital	Chiangmai	07-Nov-09			
20	Chularat 3 Theparak Hospital	Samutprakarn	12-Apr-14			
21	International Clinic Koh Chang	Trat		08-Dec-11		
22	Jetanin IVF Clinic	Bangkok		22-Jul-17		
23	Kamol Cosmetic Hospital	Bangkok	07-Nov-15			
24	Khonkaen Ram Hospital	Bangkok	29-Mar-14			
25	Kluaynamthai Home Care	Bangkok			Home Care	20-Nov-14
26	Kluaynamthai Hospital	Bangkok	12-Dec-15			
27	Kluaynamthai Polyclinic; The Shoppes Grand Rama 9 Branch	Bangkok		19-Nov-17		
28	Kluaynamthai2 Geriatric Hospital	Bangkok			Long term Care	15-Nov-14
29	Krabi Nakharin International Hospital	Krabi	02-Oct-15			
30	Kranuan Crown Prince Hospital	Khpnaen	26-May-17			
31	Ladprao Eye Center	Bangkok		06-Aug-16		
32	Mahachai Hospital Public Co.,Ltd	Samutsakhon	07-Mar-14			
33	MALI Interdisciplinary Hospital	Bangkok		15-Oct-16		
34	Metta International Eye Center	Bangkok		06-Oct-12		
35	Navamin 9 Hospital	Bangkok	18-May-13			
36	Nonthavej Hospital	Bangkok	25-Jun-11			
37	Nopparat Cosmetic Clinic	Bangkok		11-Aug-17		
38	Overbrook Hospital	Chiang Rai	03-Feb-18			

Table 2 JCI accredited Hospitals in Thailand (Cont)

No.	Hospital	Location	Hospital Programme	Non-Hospital Programme		Achieved Accreditation Date
39	Phyathai 2 Hospital	Bangkok	24-May-14		Acute Myocardial Infraction (AMI)	17-Nov-16
					Heart Failure	6-Sep-18
					Knee replacement	8-Sep-18
					Acute Ischemic stroke	19-Nov-16
40	Pitsanuvej Hospital	Phitsanulok	21-Dec-12			
41	Piyavate Hospital	Bangkok	03-Jun-17			
42	Praram 9 Hospital	Bangkok	20-Nov-10		Diabetes Mellitus Programme	4-Nov-16
					Kidney Transplant	2-Nov-16
43	Queen Sirikit Heart Center of the Northeast	Khon Kaen	26-Aug-17			
44	Rachvipa MRI Center	Bangkok		21-Mar-14		
45	Ramkhamhaeng Hospital	Bangkok	21-Aug-10			
46	Samitivej Srinakarin Hospital	Bangkok	11-Aug-07		Childhood Asthma	25-Aug-12
47	Samitivej Sriracha Hospital	Chonburi	08-Nov-08			
48	Samitivej Sukhumvit Hospital	Bangkok	27-Jan-07			
49	Sea Smile Dental Clinic	Phuket	13-Nov-14			
50	Sikarin Hatyai Hospital	Songkhla	20-Feb-15			
51	Sikarin Hospital	Bangkok	24-Nov-12		Acute Myocardial Infraction (AMI)	12-Nov-16
					Primary Stroke	26-Nov-14
					Diabetes Mellitus Programme	28-Nov-15
52	Siriraj Piyamaharajkarun Hospital	Bangkok	21-Dec-13		Knee Replacement	22-Nov-14
53	Siroj International Hospital	Phuket	15-Dec-12			
54	Sriphat Gastrointestinal and Liver Center	Chaing Mai		12-Jan-19		
55	Srisawan Hospital	Nakhon Sawan	01-Mar-14			

56	Sukumvit Hospital	Bangkok	29-Apr-15			
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Table 2 JCI accredited Hospitals in Thailand (Cont)

No.	Hospital	Location	Hospital Programme	Non-Hospital Programme		Achieved Accreditation Date
57	Synphaet Hospital	Bangkok	21-May-10			
58	Thabo Crown Prince Hospital	Nongkhai	19-Dec-15			
59	The World Medical Hospital	Nonthaburi	12-Dec-14			
60	Vejthani Hospital	Bangkok	26-Mar-16		Diabetes Type II	29-Mar-13
					Knee Replacement	31-Mar-13
					Hepatitis B	6-Jul-17
61	Vibhavadi Hospital	Bangkok	06-Apr-13			
62	Yanhee Hospital	Bangkok	22-Jan-11			

Adopted from: Author and Joint Commission International Organization website (Medical Tourism Association, 2021)

But the scope of medical tourism extends beyond cross-border healthcare (Cohen, 2008, Debata et al., 2013; Lunt & Carrera, 2010; Fetscherin & Stephano, 2016). Individuals are increasingly looking to combine their treatment journey with leisure or relaxation activities during and after their treatment. This has given rise to the concept of 'healing vacations,' further boosting the appeal of medical tourism (Jain & Ajmera., 2018; Connell, 2006; Johnston et al., 2010).

Medical tourism's success hinges on a complex interplay of various factors. Accreditation and certification of medical facilities is of utmost importance to reassure international patients about the quality of healthcare as seen in above Table 2 (Woodhead, 2013). Countries need to strive for global healthcare accreditations such as JCI, Accreditation Canada International, or Australian Council on Healthcare Standards International (MedicalTourismAssociation, 2021; Pathologists, 2021).

Cost-effectiveness is another crucial factor (Aziz et al., 2021; Carrera & Lunt, 2010; T.-H. Cham et al., 2021; Chaulagain et al., 2023). The economic advantage of low-cost yet high-quality medical care attracts patients from developed countries, where healthcare costs are high. Even after factoring in travel and accommodation costs, medical treatment in countries like Thailand, India, or Mexico can be significantly cheaper than in Western countries (Carrera & Lunt, 2010). Scholars have investigated why medical tourism becomes famous and acceptable for medical tourists Based on the extant literature review on medical tourism, affordable price is one of the distinguish factors which affects the medical tourist's decision (Ahani et al., 2021; Aziz et al., 2021; T. H. Cham et al., 2021; ResearchAndMarkets.com, 2019). Thus, in this study, author gathered the data about a price list for medical procedures in each country to see the differences shown as Table 3. Additionally, cultural competence and language proficiency of the medical and support staff also play a key role (H. Y. Wang, 2012; J.-H. Wang et al., 2020). Hospitals should ensure that their staff can communicate effectively in various languages to avoid misunderstandings, which could lead to medical errors (Wongkit & McKercher, 2013).

Table 3 Cost comparison of medical tourism

Medical Procedure	USA	UK	Thailand	India	Malaysia
Major surgeries					
Heart bypass	\$123,000 - 130,000	\$70,000 - 200,000	\$11,000 - 15,000	\$5,200 - 7,900	\$11,430 - 12,100
Heart valve replacement	\$160,000 - 170,000	\$95,000	\$10,000 - 17,000	\$5,500-9,500	\$10,580 - 13,500
Angioplasty	\$28,200 - 57,000	\$15,000-50,000	\$4,200 - 13,000	\$3,300 - 5,700	\$3,300 - 5,700
Hip replacement	\$40,364 - 43,000	\$32,000-45,000	\$12,000 - 17,000	\$7,000 - 7,200	\$7,500 - 8,000
Knee replacement	\$35,000 - 49,500	\$15,000	\$10,000 - 14,000	\$6,200 - 12,500	\$7,000 - 7,700
Hysterectomy	\$15,400 - 20,000	\$5,000-11,000	\$3,650 - 4,500	\$2,500 - 3,200	\$4,200 - 5,250
LASIK (both eyes)	\$4,000	\$2,600-7,900	\$2,310	\$1,000	\$3,450
IVF treatment	\$12,400	\$12,000	\$4,100	\$2,500	\$6,900
Spinal fusion	\$62,000 - 110,000	\$77,000-115,000	\$7,000 - 9,500	\$6,500 - 10,300	\$6,000
Cosmetic and plastic procedures					
Breast augmentation	\$6,000-12,000	\$3,700-9,300	\$2,600-3,200	\$2,800-3,000	\$3,500-4,600
Breast lift	\$4,500-4,700	\$4,600-8,500	\$2,600	\$2,800-3,000	\$4,100
Breast reduction	\$5,000-5,400	\$8,600	\$2,900	\$2,800-3,000	\$3,200
Buttlock implant	\$4,000-5,000	\$4,800	\$4,000	\$2,500	\$5,500-8,200
Buttlock lift	\$4,000-5,000	\$1,000-4,500	\$2,400	\$2,500	\$3,500
Cheek implant	\$2,000-2,500	\$2,400-5,000	\$1,200-2,500	\$2,350	\$3,400
Chin augmentation	\$1,700-2,000	\$3,000-5,000	\$700-950	\$2,200	\$2,300
Hair transplant	\$6,000-15,000	\$1,300-37,000	\$1,000-2,400	4,000-15,000	\$2,500
Vaginal rejuvenation	\$4,000-8,000	\$7,900	\$350-1,200	\$5,000-9,000	\$640

Tummy tuck	\$10,000-12,000	\$5,900-7,900	\$3,000-5,300	\$2,900-4,000	\$3,600-4,700
Liposuction	\$3,000-5,500	\$2,600-7,900	\$1,200-3,500	\$1,500-2,000	\$3,000
Nose reshaping	\$3,500-4,000	\$3,900-6,600	\$1,200	\$600-1,500	\$3,200

Table 3 Cost comparison of medical tourism (Cont)

Medical Procedure	USA	UK	Thailand	India	Malaysia
Forehead lift	\$2,500-3,000	\$3,374	\$1,400	\$2,500-3,000	\$1,600-2,400
Facelift	\$8,000-15,000	\$3,000-15,000	\$2,400-3,950	\$2,500-3,500	\$5,000
Blepharoplasty	\$2,500-5,000	\$2,600-8,000	\$3,000	\$1,500	\$3,500
Dental procedures					
Teeth whitening	\$800-1,200	\$200-920	\$100	\$175	\$73-180
Teeth bleaching	\$300-350	\$400-650	\$150	\$175	\$73-180
Cleaning	\$100-350	\$60-120	\$25-50	\$25-50	\$80-175
Single implant	\$3,500	\$3,190	\$2,000	\$250-700	\$1,100-2,200
Amalgam filling	\$200-500	\$50-250	\$20-40	\$21-42	\$10-73
Porcelain crown	\$800-3,000	\$330-1,560	\$300-470	\$140-150	N/A
Ceramic crown	\$5,500	\$330-1,560	\$470-500	\$140-211	N/A
Root canal treatment	\$500-2,000	\$60-1,300	\$150	\$90	\$460

*Prices are approximate and vary depending on accommodation, airfares, cost of travelling while in the host country of patients and companion, currency exchange and so forth. Adopted from: Author and <https://www.medicalindiatourism.com/treatment-cost.html> <https://www.health-tourism.com>

However, healthcare providers need to understand the evolving needs and expectations of medical tourists. This includes the rise of medical-wellness tourism, where patients seek to combine their healthcare journey with a vacation (Bookman, 2007; Carrera & Lunt, 2010). Hence, hospitals and clinics should consider partnering with local tourism bodies and wellness providers to offer packages that blend medical treatment with relaxation and sightseeing opportunities.

Navigating the medical tourism industry successfully requires a careful blend of assuring top-notch medical services with the appeal of a rejuvenating vacation. As the medical tourism

progress into the new millennium, the industry shows promise, but it is not without its share of obstacles. The sector struggles with a lack of clear business models, intricate industry processes, supply chain complexities, and capacity and resource utilization issues. It operates in a fiercely competitive market, demanding continuous improvements in healthcare quality (Ajmera & Jain, 2019a, 2019b). The need for effective human resource management and overcoming challenges related to resource distribution and utilization are also critical (Baltacioglu et al., 2007).

Therefore, a comprehensive understanding of medical tourism in the context of Thailand and its associated concepts is paramount for the author. In this section, an expansive exploration of medical tourism is undertaken. Initial emphasis is given to the definitions of medical tourism. Subsequently, the characteristics and context of medical tourism in the setting of globalization and specifically Thailand are examined, given the study's focus on this particular area. After conducting literature review about medical tourism has been described, then the next section will explain about the service supply chain management perspective.

2.7 Understanding of ‘Service’

In this section, the initial focus is on providing a definition of 'service.' This is followed by a transition to the 'supply chain' concept, culminating with a definition of 'service supply chain management.' The concept of the service supply chain should be contextualized and applied within the unique framework of medical tourism.

2.7.1 Definition of service

Numerous scholars have attempted to identify ‘service’ definition in general. The American Marketing Association (as cited in Cowell, 1984, p.151; Hwang, 2004) defined ‘Service’ as:

“Activities, benefits or satisfactions which are offered for sale, or are provided in connection with the sale of goods”.

While Cowell’s finding indicated that the above definition did not mention about the clear difference between goods and service and exclude the tangible goods is also offered for sales as well as service. Refining on the definition of The American Marketing Association, Stanton (1981, p.441) identified that

“Service are those separately identifiable, essentially intangible activities which provide want-satisfaction, and that are not necessarily tied to the sale of a product or another service. To produce a service may or may not require the use of tangible goods. However, when such use is required, there is no transfer of title (permanent ownership) to these tangible goods”.

In addition, Kotler & Armstrong (1991, p.221) also described the definition of service as:

“A service is an activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Its production may or may not be tied to a physical product”.

Moreover, Desmet *et al.* (1998, p.5) defined ‘service’ as:

“All those economic activities that are intangible and imply an interaction to be realised between service provider and consumer”.

2.7.2 Understanding Characteristics of Service

It is important to recognize that Service Supply Chain Management (SSC) deviates significantly from traditional supply chain processes due to its unique characteristics. According to the literature on 'Service,' it is generally agreed that there are four primary attributes of service, namely intangibility, simultaneity, heterogeneity, and perishability (Baltacioglu et al, 2007).

1) Intangibility

Numerous researchers have emphasized the distinctions between goods and services, with intangibility being the most frequently referenced characteristic. It is widely recognized that services cannot be physically interacted with, such as touching, seeing, or tasting, prior to purchase (Hwang, 2004; Lovelock, 1991). Shostack (1997) identified four main categories distinguishing goods and services. The first, pure tangible goods, involves solely physical items (e.g., soap, shampoo) without any associated service. Customers typically purchase these items directly from store shelves. The second category, tangible goods with accompanying services, includes physical products supplemented by services, like computers or cosmetics. Here, the primary aim is the sale of the tangible product. The third category, a service with accompanying goods, mainly comprises services that include accompanying physical products, as seen in airlines or transport services. The

focus here is on selling the service rather than the accompanying goods. The fourth category, pure service, concentrates solely on service offerings, as seen in sectors like education, consulting, or brokerage. Shostack's (1997) scale of market entities, which illustrates these categories, is shown in Figure 4.

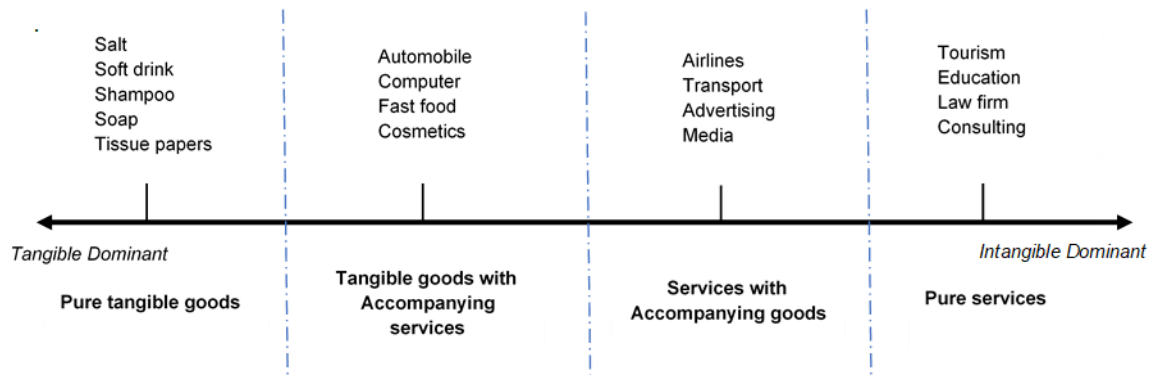


Figure 4 Scale of market entities Source: adapted from Shostack (1997)

2) Simultaneity

Simultaneity implies that services are indistinguishable from their providers and are usually delivered in the customer's presence. While tangible goods can be produced and stored in advance, services cannot. They must be consumed simultaneously with their provision (Boon-itt et al, 2017; Cowell, 1984).

3) Heterogeneity

Heterogeneity refers to the standardization of service provision. Achieving consistency in service delivery is challenging due to varying factors such as the service provider, timing, and delivery method (Mudie and Cottam, 1993). Each customer's service experience may differ not only due to the provider's approach but also due to the customer's mood, perception, attitude, and even the atmosphere at the time-of-service consumption (Baltacioglu et al, 2007).

4) Perishability

Perishability means that services cannot be stored for future use. This characteristic poses a challenge for service providers in predicting demand patterns for specific periods or items.

Services must be consumed as they are available and cannot be stockpiled for later use (Ellram et al, 2004; Baltacioglu et al, 2007).

Table 4 below outlines the characteristics of goods and services according to the four service attributes: intangibility, heterogeneity, perishability, and simultaneity (Ellram et al., 2007).

Table 4 Characteristic of goods and services in each service attribute

Service Attribute	Impact of service attribute	Goods	Services
Intangibility	Expectation	Exact specification	Service level agreements are varied
	Predictability of demand	Rely on the accurate demand forecast from customer	Unpredictable demand
	Cost	Negotiable in a large quantity, easy to calculate in advance, cost per unit/lot	Costs are determined by customer requirements, specifications and service scope each case.
	Payment	Purchase orders are verified and paid with receipt	Pay as you go, pay after consuming services or with intangible proof
	Problem resolution	Clear task and process	Lack of concrete process, more subjective
Heterogeneity	Quality	Measurable from tangible evidence	User dependent
	Consistency of output	Clear specification and consistent quality	Dependent on service provider, wider range of specification
Perishability	Interface between providers	Non-directed communication, using intermediary or customer service team to interact with customers	Direct customer facing process
	Inventory policies	Buffer demand fluctuations with inventory	Service cannot be stored, fluctuated labor capacity
Simultaneity	Point of contract	Limited to direct customer contact	More interaction between service provider and customers
	Physical separation of host firm and provider facilities	Physical distance from provider and customers	Service is needed to be consume at the service point
	Security of information/data	High	Low

Source: Adapted from Ellram et al. (2007), Ellram et al. (2004), and Boon-itt et al. (2017)

2.8 Supply Chain Management and the service industry

Supply Chain Management (SCM), once a concept exclusive to manufacturing and physical goods, has evolved and extended its relevance to virtually every industry, playing an indispensable role in managing internal organisational structures and thriving in a competitive marketplace (da Mota Pedrosa, Näslund, & Jasmand, 2012; Ellram & Murfield, 2019). At its core, SCM refers to the systematic orchestration of the movement of physical goods, services, and information from the origin point (the supplier) to the destination (the final customer) (Balfaqih, Nopiah, Saibani, & Al-Nory, 2016).

Renowned scholars have variously interpreted SCM, yet they converge on several key points. Lambert et al. (1998) defined SCM as the governance of relationships within a network of organisations, underpinned by key cross-functional business processes aimed at creating value for customers and other stakeholders. Similarly, Slack et al., (2016) as well as Chopra and Meindl (2016) stress the crucial importance of managing relationships and operational flows in order to produce and deliver valuable products and services to customers. SCM's significance lies in its ability to streamline efficiencies, mitigate costs, and deliver the right products or services at the right time and place.

Despite the wealth of research dedicated to SCM, most investigations have traditionally centred on the manufacturing industry, creating a research gap when it comes to the service sector (Sengupta et al., 2006). This under-exploration is attributed to the complexity and unique characteristics of the service industry (Giannakis, 2011; Akkermans & Vos, 2003). Consequently, as the service sectors have become a pivotal driving force in many economies, it is paramount that scholars and practitioners devote more attention to Service Supply Chain Management (SSCM).

The body of literature on SSCM is continuously growing, but there is still considerable room for development. Key areas of focus in the literature include working towards unified conceptual definitions (Ellram et al., 2004; Baltacioglu et al., 2007), devising robust measures for SSC process capabilities (Boon-itt et al, 2017), and accumulating real-world case studies on SSCM implementation (Giannakis, 2011). It is clear that the field is ripe for comprehensive, in-depth research on SSCM that can yield invaluable insights, bridge existing knowledge gaps, and foster a more profound understanding of the industry.

2.8.1 Structure of Traditional Supply Chain Management vs. Service Supply Chain Management

Considerable efforts have been made in the existing literature to explore traditional manufacturing supply chain management. This line of study generally agrees that traditional supply chain management involves the cohesive integration of business processes from the initial to the final stages, which are primarily steered by effective information system management (da Mota Pedrosa et al., 2012; Ferrer & Medhekar, 2012; Handfield & Bechtel, 2002).

A multitude of processes is involved in supply chain management. These include procurement, sourcing, capacity planning, forecasting and demand management, inventory management, warehouse management, distribution management, traceability management, and flow and return management, as well as information and technology management (Chopra & Meindl, 2004).

Conventional manufacturing supply chains typically encompass the components mentioned above, as summarized in the table 5 below. These components serve as the building blocks of a traditional supply chain in manufacturing, playing distinct yet interconnected roles in delivering value to the end consumer. It should be noted, however, that the arrangement and significance of these components may vary depending on the specific context and nature of the manufacturing industry in question.

Table 5 A traditional manufacturing supply chain role's description

Component	Role description	Reference
Supplier	The extent to who supplies, prepares part component, input resources and raw materials.	Slack et al., (2016); Sampson & Spring, (2012); Lambert et al. (1998); Chopra and Meindl, (2016);
Labor	To extent to who puts human effort into the firm production.	Sampson & Spring, (2012);
Engineering	To extent to who are able to design goods specification, plan and control the production process.	Lambert et al. (1998); Sampson & Spring, (2012); Chopra and Meindl (2016);

Production	To extent to which the processes are executed in the production line.	Chopra and Meindl (2016); Sampson & Spring, (2012); Lambert et al. (1998);
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Table 6 A traditional manufacturing supply chain role's description (Cont)

Component	Role description	Reference
Product	The yield of production or accepted widely known as finished goods.	Sampson & Spring, (2012); Slack et al., (2016)
Quality assurance	To extent to guarantee the quality and specification of work-in-process material and finished goods from production.	Sampson & Spring, (2012);
Inventory	The buffers gap between the production stage and customer demand.	Sampson & Spring, (2012); Chopra and Meindl (2016); Lambert et al. (1998);
Competitors	To extent to firms or direct and indirect businesses which do the same category or type of production. It also encourages improving the firm performance.	Sampson & Spring, (2012);
Customers	To extent to select, order, pay for the finished goods or production output.	Sampson & Spring, (2012); Slack et al., (2016); Lambert et al. (1998); Chopra and Meindl (2016)

Sampson and Spring (2012) have carried out an extensive study on a link between traditional manufacturing supply chain management and service supply chain management showing in the Figure 5. as following.

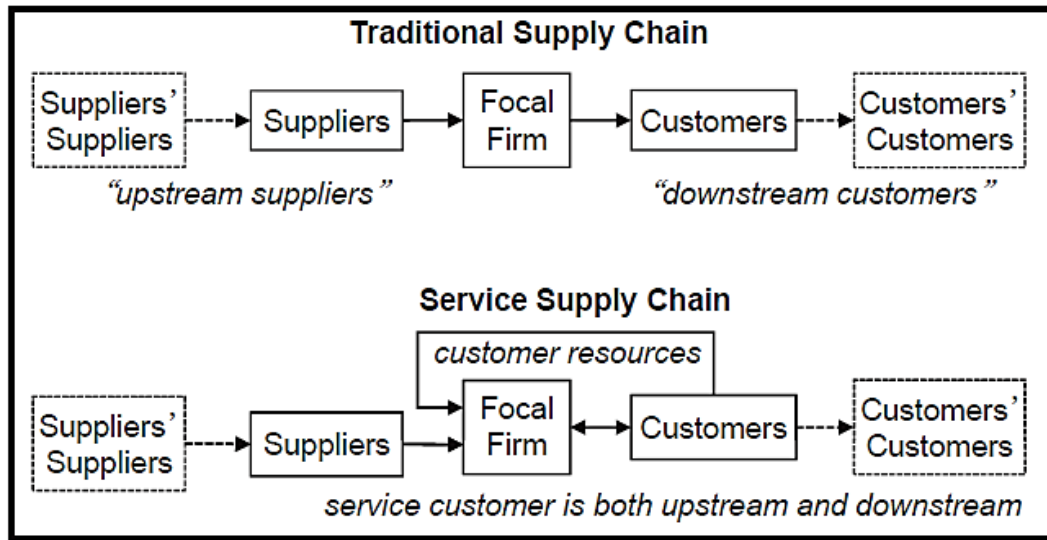


Figure 5 The difference between traditional supply chain and service supply chain (Sampson & Spring, 2012)

As depicted in Figure 5, traditional manufacturing supply chains are bifurcated into two segments—upstream (suppliers) and downstream (customers). These chains feature a unidirectional relationship that starts with suppliers ordering raw materials from their respective sources. These materials are then prepped and forwarded to the focal firm for the production process. This focal entity operates as an intermediary, converting raw materials into finished goods per customer specifications. In traditional manufacturing supply chains, customers play roles in several supply chain functions but are primarily responsible for placing orders, making payments, and consuming the finished goods (Sampson and Spring, 2012).

On the contrary, service supply chains, as proposed by Sampson and Froehle (2006), are defined by a bidirectional relationship based on the Unified Service Theory (UST) (Sampson, 2000). Service supply chains exhibit a complex integration structure involving direct and indirect service providers (Song & Xu, 2011 cited in Sakhuja & Jain, 2012). Sampson (2000) emphasizes that customers in service supply chains assume roles in both upstream and downstream processes, a concept known as "customer-supplier duality." This concept suggests that customers essentially function as suppliers, providing inputs and articulating their demands, preferences, and product specifications (Sampson and Spring, 2012).

Similar to traditional chains, service supply chains initiate with suppliers sourcing raw materials. However, the focal firm in this context differs from that in traditional chains, as it must wait for customer confirmation or request before preparing and delivering the service product. A distinctive characteristic of service supply chains, compared to traditional manufacturing chains, is the active interaction process, where the service provider or intermediary must be responsive to customer requests (Sampson, 2000).

The processes within a service supply chain are crucial for maintaining a balance between upstream production capacity and downstream customer demand (Giannakis, 2011). Consequently, Sengupta et al. (2006) suggest the necessity to underscore the differences between traditional manufacturing and service supply chains, given their distinct critical components. From a traditional manufacturing perspective, delivering physical products implies standardized procedures and quality assurance. Conversely, in a service supply chain context, human resources play a significant role in delivering service value to customers.

2.9 Service Supply Chain Management

The service supply chain involves a network of diverse participants and organizations, each interconnected through a series of activities (Sakhuja & Jain, 2012). The effective integration of service operations within an organization is crucial for the delivery of high-value services and the achievement of maximum customer satisfaction. Various studies have indicated that the defining feature of the service supply chain is the involvement of the customer (Mersha, 1990; Nie & Kellog, 1999 cited in Sampson & Spring, 2012). Given this feature, the characteristics of the service supply chain also include i) the execution of multiple sequential processes by different service providers, ii) the significant role of human resources or skilled labor in delivering service value to the customer, and iii) the delivery of service value as the main goal of the service supply chain, rather than the material flow (Sakhuja & Jain, 2012).

Various scholars have provided different definitions for the Service Supply Chain, each with unique insights and perspectives. Table 7 provides a summary of these definitions from different authors.

Table 7 Service supply chain management definition

Authors	Definitions
Ellram et al. (2004: p.17)	“The management of information, processes, capacity, service performance and funds from the earliest supplier to the ultimate customer”.
Baltacioglu et al. (2007: p. 112)	“Service supply chain is the network of suppliers, service providers, consumers and other supporting units that performs the functions of transaction of resources required to produce services; transformation of these resources into supporting and core service; and the delivery of these services to customers.”
Wang et al. (2015: p 686)	Classifying the definition of service supply chains (SSCs) into two types. Service Only Supply Chain (SOSCs): “Products are pure service” Product Service Supply Chain (PSSCs):” Physical products together with significant service considerations”
Prahalad & Hamel, (1990: p. 4)	SSC process capability is consisted of many essential competencies for “coordinating diverse production skills and integrate multiple streams of technologies”.
Johnson & Mena (2008; p.28)	“The management of information, processes, capacity (people, equipment and facilities), products, services and funds from the earliest supplier to the ultimate customer”.
Sampson (2000)	“The management of the flow of information, funds and materials between the service firm, its earliest suppliers and the ultimate customer in the process of transforming tangible and/or intangible inputs into tangible and/or intangible service output valued by the customer”.

The structure of the service supply chain is notably more complex than its traditional manufacturing counterpart (Li et al., 2008). Considering the varying forms of services, scholars have proposed different structures for the Service Supply Chain, encompassing the serial-service

supply chain, parallel service supply chain, and hybrid service supply chain (Li et al, 2008; Song et al, 2011; He et al, 2010). Li et al. (2008) explained that the primary characteristic of a Serial-service supply chain is its sequential task completion, similar to a production line, where processes cannot overlap or occur simultaneously. Conversely, a Parallel-service supply chain emphasizes results; the entire chain processes a single input to generate multiple outputs. Suppliers and service providers within a parallel-SCC often maintain strong, close relationships. A Hybrid service supply chain represents a combination of the serial and parallel supply chains (Li et al., 2008).

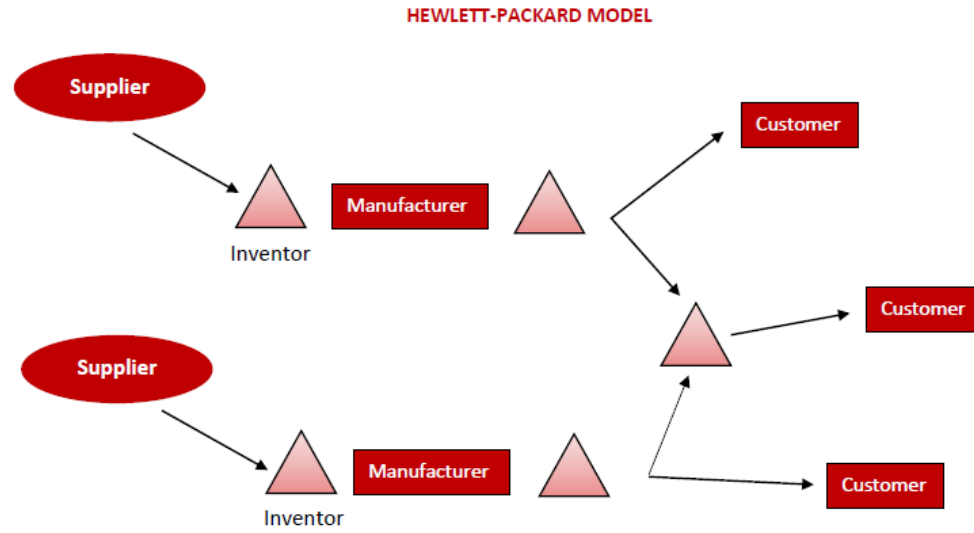
2.9.1 The evolution of Service Supply Chain Management

As concepts around the structure of service supply chains have evolved, author had applied existing traditional supply chain models to service processes to understand their practicality within the service industry. This section considers six such models that have been adapted for service industry application by various researchers: the Hewlett-Packard model (Lee & Billington, 1995, as cited in Ellram et al., 2004), the SCOR model, the GSCF framework (Croxtton, 2001), Ellram et al.'s Service supply chain model (2004), the IUE-SCC Model (Baltacioglu et al., 2007), and Giannakis's SSC conceptual framework (Giannakis, 2011).

As time has passed, numerous studies have sought to establish service supply chain frameworks with an aim to gain deeper insights into the fundamental needs and interests of both service providers and customers.

I. Hewlett-Packard Model

The model under discussion, proposed by Lee and Billington (1995), has been utilized by Hewlett-Packard and is displayed below in Figure 6. This model encapsulates the traditional manufacturing supply chain. The figure illustrates an upstream or one-way flow, beginning with the suppliers, followed by the manufacturers, and finally reaching the customers. All nodes in this model are connected via inventory buffers. When attempting to apply this model to a service supply chain, considerable gaps emerge from the downstream or customer side due to a lack of interactive communication



Source: Lee & Billington (1995)

Figure 6 The Hewlett-Packard model

II. .SCOR Model

The existing literature highlights the SCOR model as a roadmap for supply chain processes and activities (Ellram et al., 2004). This model, formulated by the Supply-Chain Council, consists of five fundamental components: plan, source, make, deliver, and return (see Figure 7) (Supply-Chain Council, 2004). While it's generally accepted that the SCOR model is primarily utilized for traditional manufacturing supply chains, aiming for customer satisfaction and efficient production, applying this model to a service supply chain isn't always successful. This discrepancy arises because services cannot be stockpiled or created ahead of time, and each process within the SCOR model doesn't align perfectly with the nature of the service industry (Ellram et al., 2004).

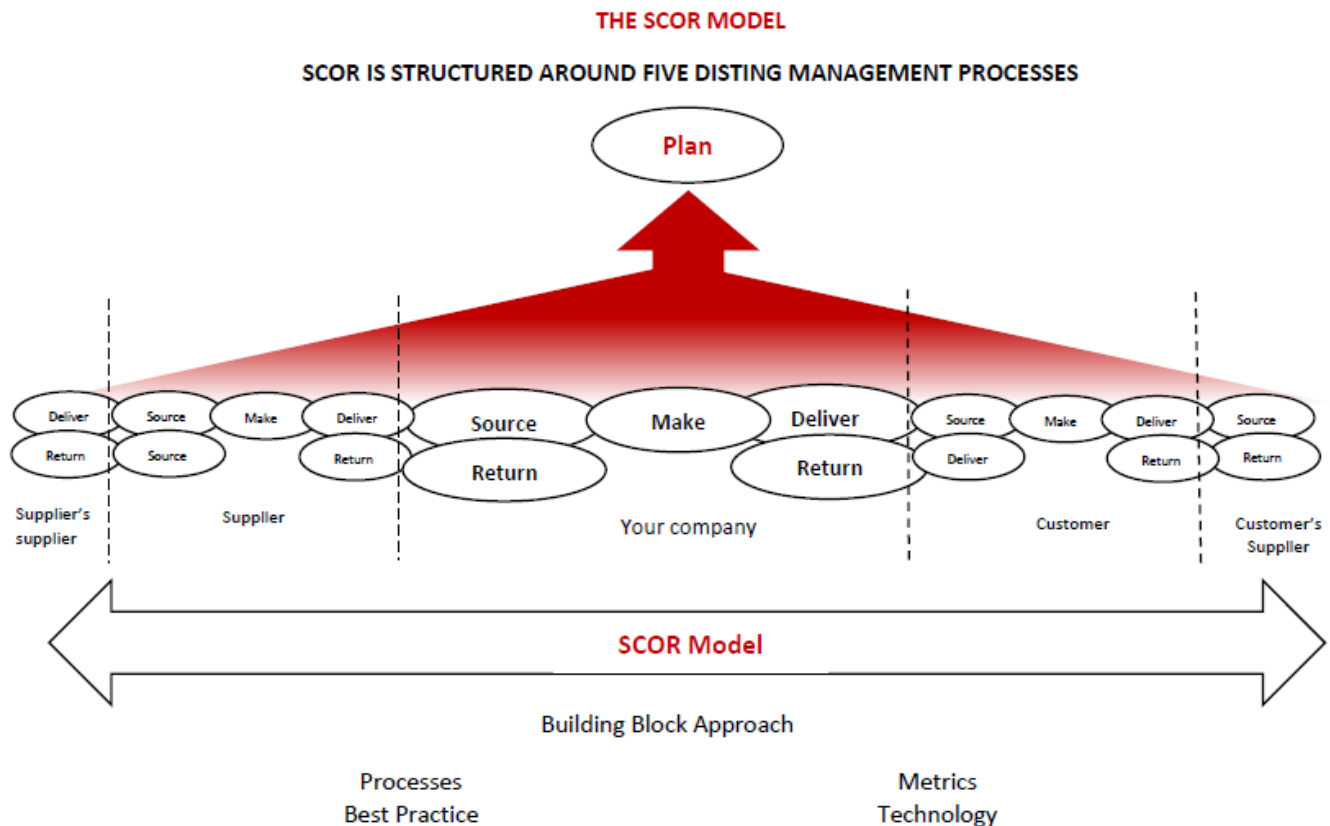
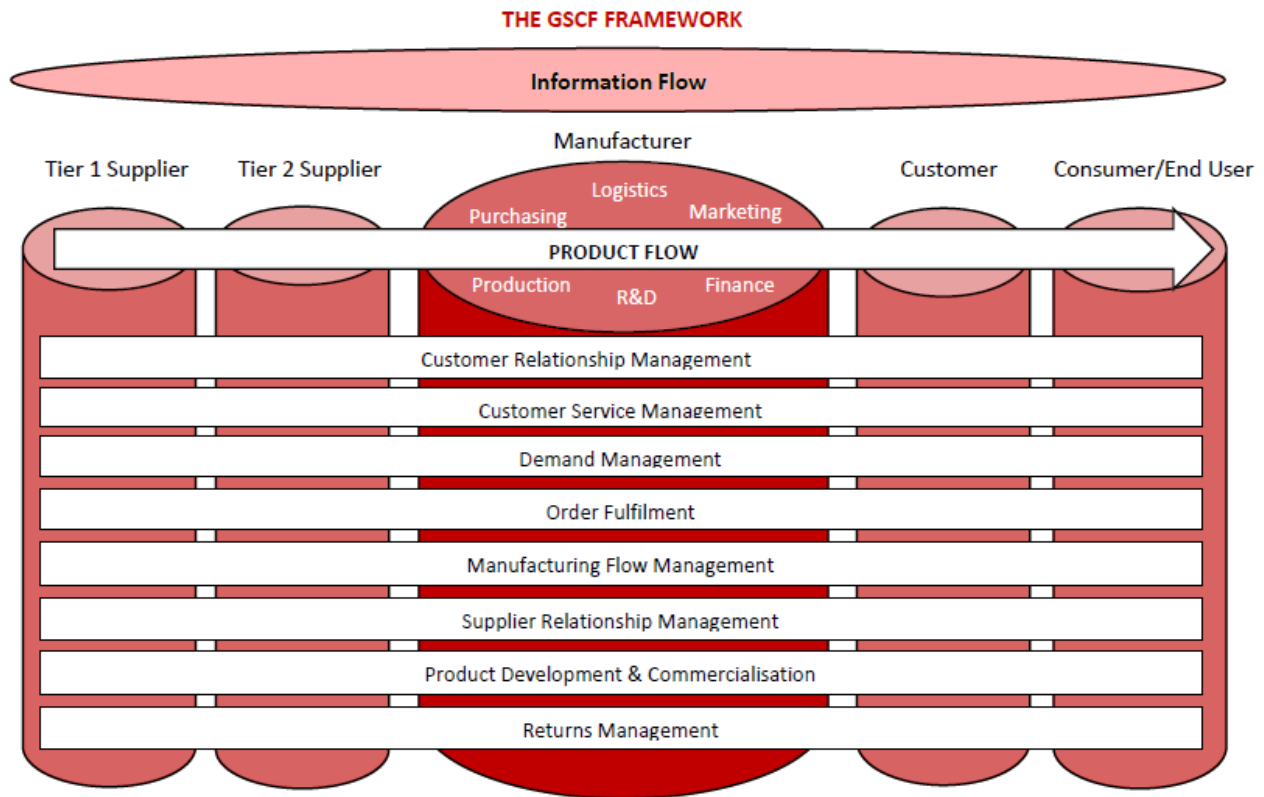


Figure 7 The SCOR Model

III. GSCF Model

Croxton et al. (2001) introduced the GSCF model, designed to suit the service supply chain (see Figure 8). This model includes three elements: business process, management components, and structured chain. The GSCF model can accommodate the service supply chain by mapping out every stage from supplier and manufacturer to customer, and even customer's customer. Information Technology permeates throughout the supply chain in this model. However, a gap exists in this model since services cannot go through a return cycle (Ellram et al., 2004).



Source: Croxton et al., (2001: P.14)

Figure 8 The GSCF Model

IV. Ellram et al. (2004)'s service supply chain model

Ellram et al. (2004) pioneered an approach to studying service supply chain, starting by choosing the term "service performance" over "services and service delivery". Capacity is presented as inventory within the service supply chain. The model illustrates key service processes and flows such as information flow, capacity and skills management, demand management, customer relationship management, supplier relationship management, service delivery management, and cash flow, as shown in Figure 9.

Notably, the model underscores that the customer or buyer is a major source of uncertainty (Davis, 1993, as cited in Ellram et al., 2004). The customer is the focal point for customer relationship management. The model suggests that an ideal situation for the service supply chain would involve

each process performing appropriately, which would tend to reduce supply chain uncertainty and improve outcomes and overall performance.

However, Ellram et al. (2004) also noted that there are several reasons why the ideal service supply chain model cannot be applied in every situation. For instance, some professional service agreements are executed without explicit specifications. Additionally, service specifications are usually hard to clearly define, and there is often a lack of identification of service management problems.

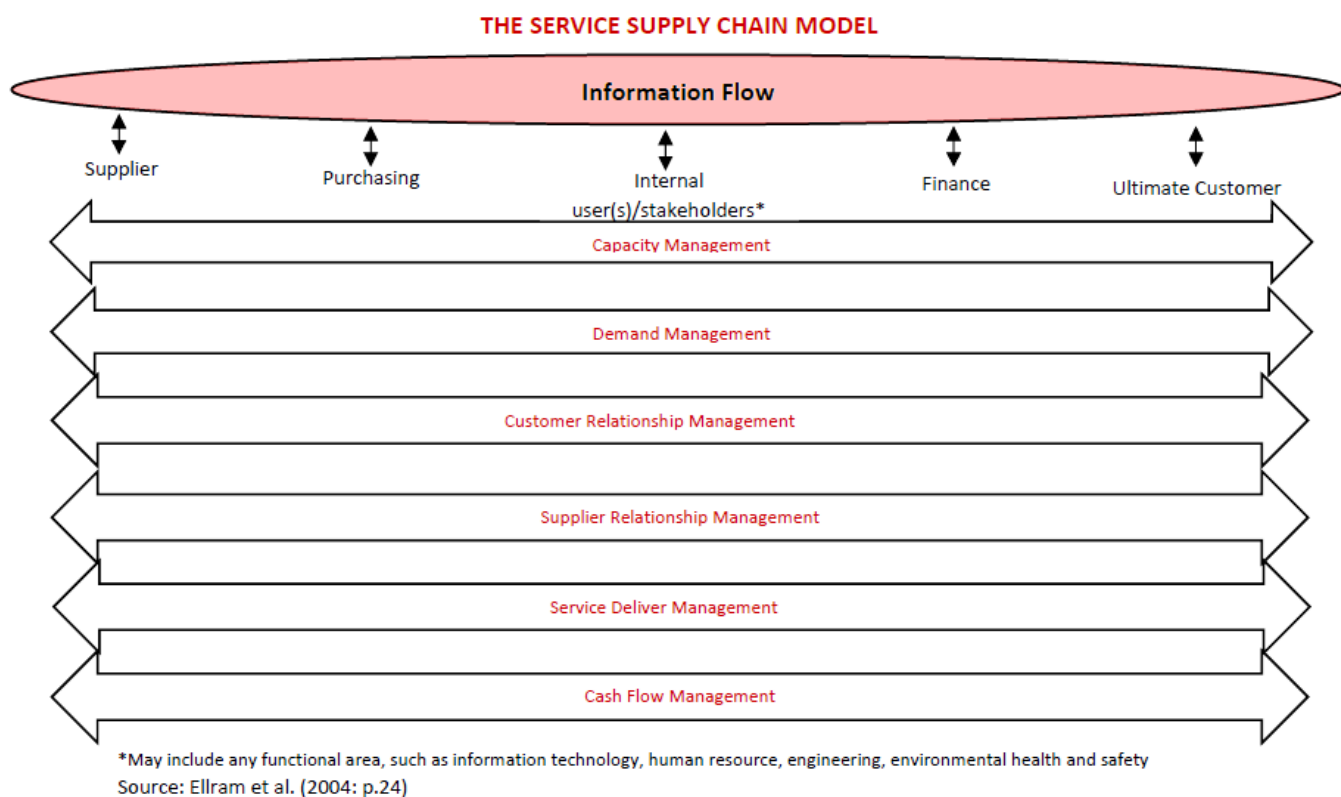


Figure 9 A service supply chain model (Ellram et al.,2004)

V. IUE-SCC Model

The model proposed by Baltacioglu et al. (2007) consists of three main components: the supplier, the service provider, and the customer, as depicted in Figure 10. The supplier's role is to provide

materials and services directly to the service provider. The service provider then takes on the responsibility of preparing and delivering the service process and service product to the customer. Like a manufacturer or intermediary in a traditional manufacturing supply chain, the service provider plays a crucial role in delivering service value to the customer. The IUE-SCC model underscores the unique characteristics of services, which are simultaneity and perishability. Consequently, the service provider and the customer need to be present at the point of service delivery. The service provider delivers the service, and the customer consumes the service at the same time and place. This reflects the immediate and non-storable nature of services, as highlighted by Baltacioglu et al. (2007).

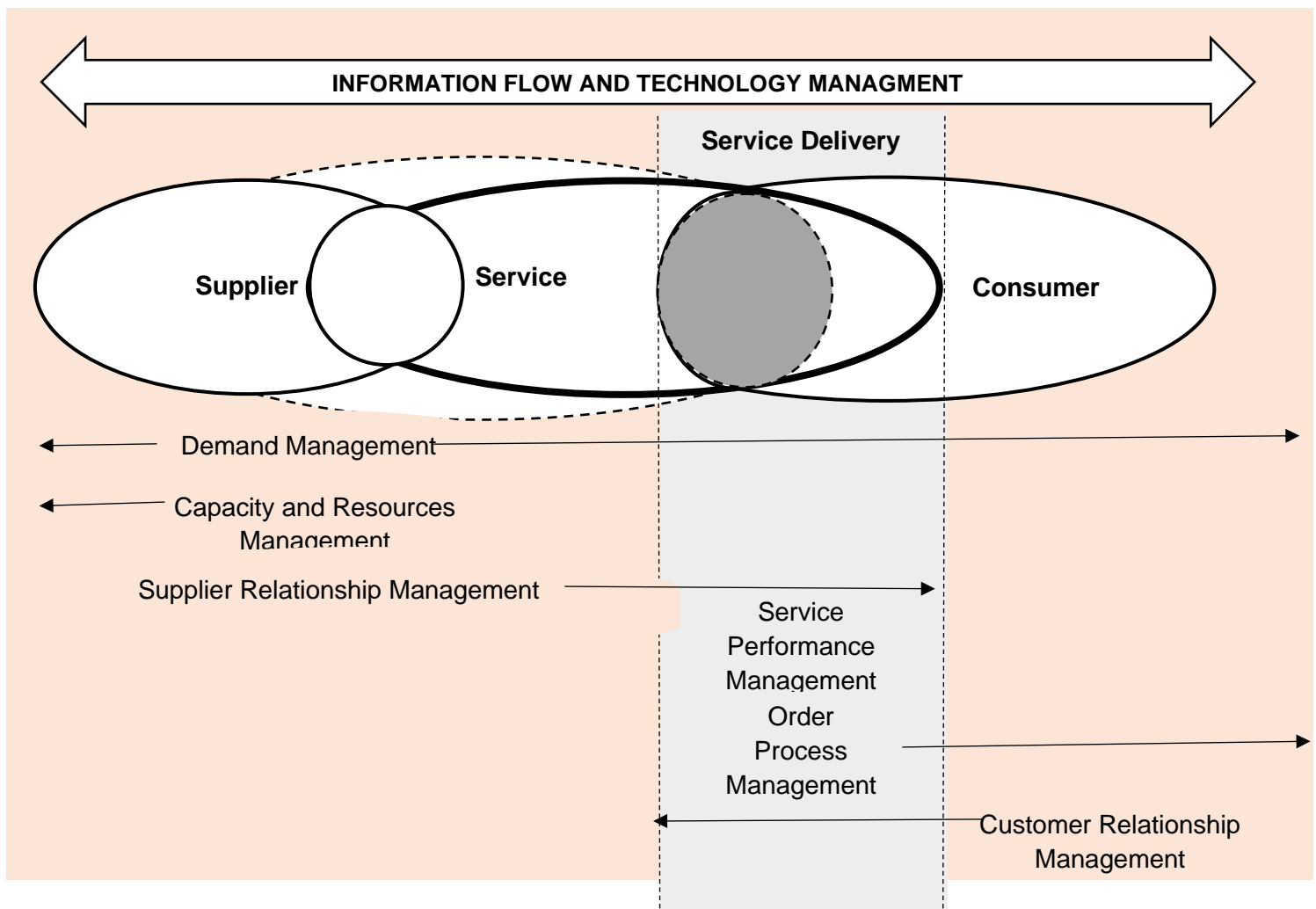


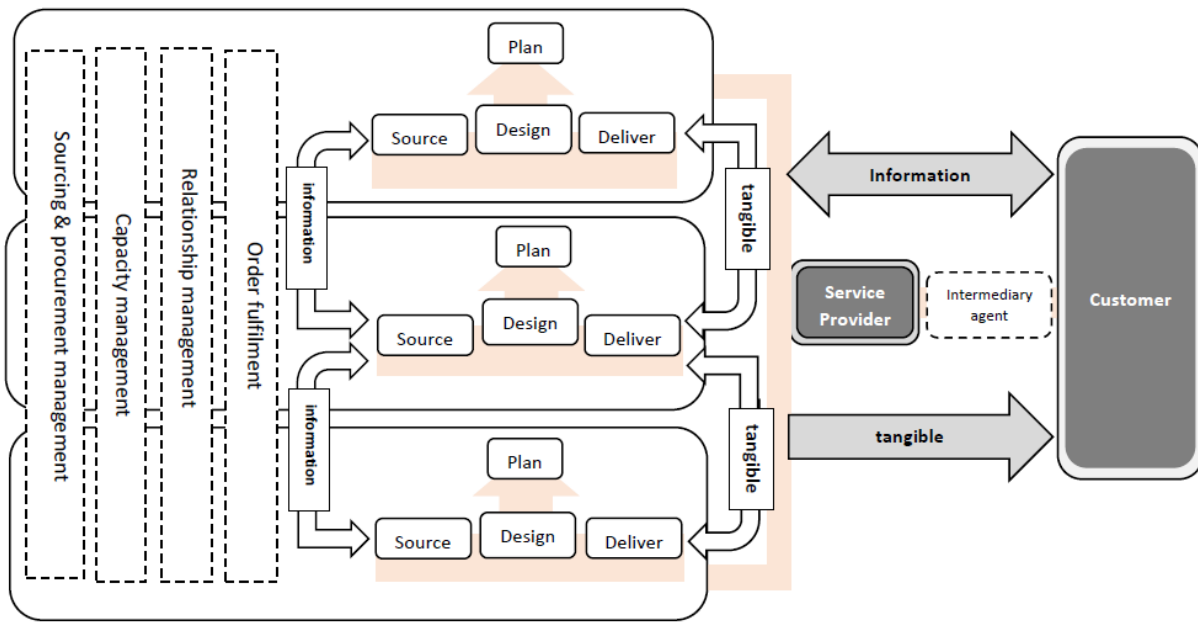
Figure 10 The IUE-SCC Model (Baltacioglu et al., 2007)

Baltacioglu et al. (2007) constructed three units in this chain: the supplier, the service provider, and the customer (see Figure 11). The supplier has the role of serving the materials and services directly to the service provider. The service provider takes a responsibility for preparing the service process and service product to the customer. The service provider plays critical role as the manufacturer and intermediary in traditional manufacturing supply chain to perform and deliver service value to the customer. The IUE-SCC model highlights the characteristics of service which are simultaneity and perishability. Hence, the service provider and customer need to be at the service point in order to deliver and consume the service at the service delivery point (Baltacioglu et al., 2007).

VI. Giannakis's SSC conceptual framework

The model proposed by Giannakis (2011) sketches an outline of the service supply chain, its coordination, and performance management, as shown in Figure 11. The model encompasses several key roles in the chain: human resources, service supply chain processes, shared information and technology, service providers, intermediaries, and customers. The model also highlights the distinctions between traditional manufacturing supply chains and service supply chains, particularly with regard to the processes of value delivery to the customer and transformation.

Giannakis (2011) emphasizes the importance of human resources in the service supply chain. This includes skilled labor and professionals who directly deliver the service to the customer. Moreover, the model illustrates how shared information and technology, including data analytics and service supply chain processes, contribute to the delivery of value to the customer. In the Giannakis model, the service provider and the intermediary play a significant role in coordinating the processes in the chain, managing customer expectations, and ensuring the successful delivery of the service. The customer, being at the receiving end of the chain, is the ultimate judge of the service's value.



Source: Giannakis (2011: p.1820)

Figure 11 Giannakis's SSC conceptual framework

This model, while employing elements of existing SCM models, is specifically tailored to suit the unique characteristics and demands of service supply chains. This demonstrates how the principles of supply chain management can be adapted to different contexts and sectors, providing a useful framework for understanding and managing the flow of services from providers to customers.

These analyses underline the importance of having models specifically tailored for service supply chains, as the characteristics of services can differ significantly from those of physical products. Table 8 below describes the comparison strengths and weakness from each model.

Table 8 The comparison strengths and weakness from each model for SSC framework

Model	Strength	Weakness
Hewlett-Packard Model	This model is simple and easy to understand. It clearly shows the sequence of operations and the role of inventory as a buffer.	As a model initially designed for manufacturing supply chains, it lacks interactive communication, which is crucial in-service supply chains. Also, it is too simplified to handle complex supply chain scenarios, and it doesn't consider the simultaneous production and consumption of services.
SCOR Model	It is a highly comprehensive model that covers all aspects of supply chain activities and has been widely accepted in the manufacturing sector.	Despite its popularity in the manufacturing sector, the model fails to capture some unique characteristics of service supply chains. Specifically, it cannot accommodate the fact that services cannot be stored or made in advance.
GSCF Model	This model provides a detailed flow from supplier to customer's customer. It includes three components that capture the end-to-end process in a supply chain.	It fails to address the issue of service returns, which is a critical aspect of service supply chains. It also assumes that services can be returned, which is often not the case.

Table 9 The comparison strengths and weakness from each model for SSC framework (Cont)

Model	Strength	Weakness
Ellram et al. (2004)'s Service Supply Chain Model	This model is tailored for service supply chains and captures key aspects such as customer relationship management and service delivery management. It considers the customer as a major source of uncertainty, which is a realistic aspect of service delivery.	The model may be hard to apply to every situation, as service agreements can be implemented without explicit specifications. Also, service specifications are often hard to define, and the model assumes an ideal situation, which may not always be practical.
IUE-SCC Model	This model effectively emphasizes the characteristics of service delivery such as simultaneity and perishability, and it captures the roles of suppliers, service providers, and customers very well.	The model doesn't offer a solution for managing the inherent uncertainty of customer behavior, which is a critical aspect of service supply chains.
Giannakis's SSC Conceptual Framework	This model is comprehensive and incorporates key roles, information and technology, and processes in service supply chains. It also acknowledges the importance of human resources and acknowledges the customer's role in determining the value of service.	The model, while very detailed, may be complex and challenging to implement. Also, while it accounts for many aspects of service delivery, it may still lack some aspects specific to certain service industries.

Source: (Baltacioglu, Ada, Kaplan, Yurt And, & Cem Kaplan, 2007; Ellram, Tate, & Billington, 2004; Giannakis, 2011; Olya & Gavilyan, 2017)

Based on the extensive literature review of each model, the best model can vary depending on the specific context of a given service supply chain and its unique requirements. Each model has its strengths and weaknesses, and certain models might be more appropriate for particular types of services or industries. There is no one-size-fits-all model for service supply chains. The best model for a particular service supply chain will depend on the specific characteristics and requirements of the service being delivered. It is crucial to choose a model that best aligns with the nature of the service, the structure of the organization, and the needs of the customers.

In this study, author also proposed the service supply chain framework in the next chapter of theoretical foundation and framework development. Literally, Service supply chains are complex and multifaceted, and the best model depends on the specific characteristics of the service, the structure of the organization, and customer needs (Boon-Itt, Wong, & Wong, 2017; Cho et al., 2012; W. Liu, Wang, Long, Shen, & Shi, 2019). When developing the SSC model, the author must carefully consider a series of factors and follow a step-by-step approach. The study of existing models provides a robust foundation for the author's framework (Somabutr, Pandian, & Roh, 2020, 2021).

2.10 Service Supply Chain Management (SSC) dimensions

The literature on traditional supply chain management processes, as they relate to service processes, highlights the replacement of certain processes in the manufacturing industry with customer relationship management in the service industry. (Boon-Itt et al., 2017; Cho et al., 2012; Ellram & Murfield, 2019) Since services cannot be recycled or reversed after delivery to customers, the reverse management process in manufacturing is substituted with customer relationship management and order process management in services (Ellram et al., 2004; Baltacioglu et al., 2007). Ellram et al. (2004) and Baltacioglu et al. (2007) have provided early studies on seven dimensions of service supply chain management. These dimensions have been further extended to include the following section. SSC processes relate internal and external organisation development; therefore, it is necessary to adapt and incorporate proactive in order to gain higher service performance and customer satisfaction.

2.10.1 Demand management process

Demand management plays a crucial role in service supply chain management by ensuring that service providers can effectively anticipate and meet customer demand. It involves the capabilities of accurately estimating forecasts, managing customer demand, and shaping service capacity through the use of information (Berry et al., 1979; Mabert, 1982, as cited in Boon-itt et al., 2017).

The accurate estimation of demand forecasts is essential for service providers as services cannot be stored like physical goods (Ahani et al., 2021; Baashar et al., 2020; Baltacioglu et al.,

2007). Service characteristics such as uncertainty and unpredictability make demand management challenging. To overcome these challenges, service providers must have the capabilities to collect and analyze data, apply forecasting techniques, and utilize information technology systems to obtain accurate demand forecasts (Boon-itt et al., 2017).

Managing customer demand involves understanding customer preferences, behavior, and expectations. Service providers need to align their service offerings with customer demand patterns and adapt their capacity accordingly (Cormany & Baloglu, 2011; de Vries & Huijsman, 2011). This requires a deep understanding of customer needs, market trends, and the ability to segment customers based on their demand characteristics (Boon-itt et al., 2017). By effectively managing customer demand, service providers can optimize resource allocation, minimize service gaps, and enhance customer satisfaction.

Shaping service capacity is another critical aspect of demand management (Ferrer & Medhekar, 2012). Service capacity must be aligned with customer demand to avoid underutilization or overutilization of resources. Service providers need to determine the appropriate level of capacity that can meet customer demand while ensuring operational efficiency (Baltacioglu et al., 2007). This involves strategic planning, resource allocation, and capacity adjustments based on demand fluctuations and market dynamics.

To achieve effective demand management, service providers need to integrate information from various sources, such as customer feedback, market research, and internal data, to gain insights into customer preferences and demand patterns (Boon-itt et al., 2017). Advanced technologies, such as data analytics and artificial intelligence, can be employed to analyze large volumes of data and generate accurate demand forecasts. Demand management in service supply chain management involves accurately estimating demand forecasts, managing customer demand, and shaping service capacity based on customer needs and market dynamics. By effectively managing demand, service providers can optimize resource allocation, minimize service gaps, and enhance customer satisfaction (Olya & Al-ansi, 2018; Saccani, Johansson, & Perona, 2007).

2.10.2 Capacity and resource management process

Due to the perishability and heterogeneity of services, capacity and resource management in service firms requires updating capacity planning and information. It involves balancing

customer demand with the firm's service capacity, including physical resources, facilities, inventory, labor, and intangible resources (Baltacioglu et al., 2007). Effective capacity and resource management entails matching capacity to customer demand, scheduling work shifts or appointments, and maintaining service capacity to meet maximum customer demand (Crandall & Markland, 1996, as cited in Baltacioglu et al., 2007).

This includes the ability to manage the physical resource, facilities, inventory and labor and intangible resource such as patents, copyrights, know-how and experience within firm. There are some problems and complex situation regarding to the capacity management, such as there is usually insufficient and less accurate information. A successful capacity and resource management can be proactive solved by matching the exact capacity to customer demand, scheduling the work shift or arrange the appointment, and maintaining a service capacity to the maximum customer demand (Crandall & Markland, 1996 cited in Baltacioglu et al., 2007:11).

2.10.3 Customer relationship management process

Customer relationship management encompasses the capability to interact with internal firms and customers, create customer demand, and develop long-term customer relationships through real-time information technology. It also involves improving communication with customers and understanding customer demand patterns (Boon-itt et al., 2017; Baltacioglu et al., 2007). Customer relationship management is crucial for marketing research, capacity resource planning, and providing personalized service experiences. In addition, improving communication with customers and understanding the prediction of customer demand can also lead to customer relationship management (Boon-itt et al., 2017; Baltacioglu et al., 2007). Customer relationship management is the vital function which is about intensive labor involvement. Customer relationship management supports firm such as encouraging opportunities to use information for creating value to customer, getting better customer's satisfaction, and classifying key customers and target group (Maull, Geraldi, & Johnston, 2012; Olya & Al-ansi, 2018). Moreover, customer relationship management also help customers input their service specification and special service requirements. In the service industries, this function is significant for marketing research and capacity resource planning.

2.10.4 Supplier relationship management process

Supplier relationship management (SRM) focuses on managing and maintaining relationships between firms and their suppliers (Chopra & Meindl, 2004). It supports planning, sourcing materials, coordinating with suppliers, and developing supplier service quality (Baltacioglu et al., 2007). One key objective of SRM is effective planning, which includes aligning sourcing strategies with business goals and identifying the right suppliers to meet specific requirements. Through strategic planning, companies can identify potential suppliers, evaluate their capabilities, and select those that best align with their needs (Baltacioglu et al., 2007).

Once suppliers have been identified and selected, SRM involves ongoing coordination and collaboration to ensure smooth and efficient supply chain operations. This includes establishing effective channels of communication, sharing information on demand forecasts and production schedules, and collaborating on product development and improvement initiatives (Chopra & Meindl, 2004). Furthermore, supplier relationship management includes efforts to develop and enhance supplier service quality. This entails setting clear expectations and performance metrics, monitoring supplier performance against these metrics, and providing feedback and guidance for improvement (Baltacioglu et al., 2007).

Building long-term relationships with key suppliers is a critical aspect of SRM. Long-term partnerships provide stability and reliability in the supply chain, reduce transaction costs, and foster mutual trust and commitment (Chopra & Meindl, 2004). To effectively manage supplier relationships, it is essential to measure and evaluate supplier performance. This involves establishing key performance indicators (KPIs) and conducting regular performance assessments (Baltacioglu et al., 2007).

Supplier relationship management plays a vital role in supply chain management. It encompasses various activities aimed at managing and maintaining relationships with suppliers, including planning, sourcing, coordination, and performance evaluation (Chopra & Meindl, 2004; Baltacioglu et al., 2007). By effectively managing supplier relationships, companies can enhance supply chain efficiency, achieve cost savings, drive innovation, and gain a competitive edge in the marketplace.

2.10.5 Order process management process

Order process management is a crucial aspect of service operations, involving the efficient handling of customer orders from receipt to fulfillment (Cho et al., 2012; Chung-Herrera, 2007; Cormany & Baloglu, 2011). In service settings, where services are delivered after receiving an order, effective order process management is of paramount importance. Service providers must have well-defined procedures in place to receive, process, and fulfill customer orders (Boon-Itt et al., 2017). This includes promptly capturing order details, verifying order specifications, and ensuring that all necessary information is accurately recorded (de Vries & Huijsman, 2011; Ferrer & Medhekar, 2012). Timely and accurate order processing is essential to meet customer expectations and provide a seamless service experience (Ellram et al., 2004).

In service industries, customers often have specific requirements or requests that may deviate from standardized offerings (Maull et al., 2012). Therefore, service providers must carefully communicate with customers to understand their unique needs and expectations. Effective order process management entails actively engaging with customers, clarifying their requirements, and discussing any modifications or customization necessary to meet their specific needs (Metters & Marucheck, 2007). Information technology systems play a crucial role in order process management, facilitating the smooth flow of order-related information and enabling timely communication between the service provider and the customer. Automated systems can help streamline the order management process, ensuring that orders are efficiently processed, tracked, and fulfilled (Baltacioglu et al., 2007).

Well-organized order process management is essential for service businesses to deliver services in a timely manner (Ferrer & Medhekar, 2012; Giannakis, 2011; Ho et al., 2015). By closely managing the order process, service providers can effectively allocate resources, schedule service delivery, and ensure that the necessary materials and personnel are available when needed. This helps to minimize delays, reduce the risk of errors, and enhance overall customer satisfaction (Boon-itt et al., 2017).

Order process management in service settings involves receiving, processing, and fulfilling customer orders in a timely and accurate manner (Mehrparvar, Shahin, & Karbasian, 2014; Meijboom, Schmidt-Bakx, & Westert, 2011). Effective communication with customers, customization to meet unique requirements, and the use of information technology systems are

key elements in ensuring successful order processing and delivery. By optimizing order process management, service businesses can enhance customer satisfaction, improve operational efficiency, and gain a competitive advantage in the marketplace (Saccani et al., 2007; Somabutr et al., 2020).

2.10.6 Service performance management

Service performance management is a multifaceted discipline that focuses on managing and enhancing the performance of service processes to meet customer requirements and deliver exceptional service experiences (Ferrer & Medhekar, 2012; Fetscherin & Stephano, 2016). It encompasses various aspects, including service delivery management, order process management, and overall service process improvement (Boon-itt & Pongpanarat, 2011; Boon-Itt et al., 2017).

One key element of service performance management is service delivery management, which involves ensuring that services are delivered to the right customers, at the right place and time, and according to predefined service standards (Boon-itt et al., 2017). This requires effective coordination and synchronization of resources, such as skilled personnel, facilities, and equipment, to ensure seamless service delivery (Mehrparvar et al., 2014; Olya & Al-ansi, 2018).

Order process management also falls under the purview of service performance management. By efficiently managing the order process, service providers can ensure that customer orders are processed accurately and promptly, and that service delivery is aligned with customer expectations (Lambert et al., 1998). This includes activities such as order entry, order tracking, and order status communication, all of which contribute to a smooth and streamlined service experience.

Furthermore, service performance management encompasses continuous improvement efforts aimed at enhancing the overall performance of service processes (Scott E Sampson & Spring, 2012; Somabutr et al., 2020, 2021). This involves analyzing and monitoring key performance indicators (KPIs), such as service quality, customer satisfaction, and process efficiency, to identify areas for improvement (Baltacioglu et al., 2007). By employing methodologies such as Lean Six Sigma or Total Quality Management, service providers can systematically identify and eliminate process inefficiencies, reduce waste, and enhance service delivery effectiveness.

Human resources play a pivotal role in service performance management. Skilled and motivated service employees are critical for delivering high-quality services and meeting customer

expectations (Ellram et al., 2004). Service organizations must invest in training and development programs to equip their employees with the necessary skills and knowledge to perform their roles effectively. Additionally, performance management systems can be implemented to measure and track individual and team performance, providing feedback and incentives to drive continuous improvement.

Service performance management involves managing and improving the performance of service processes to meet customer requirements and deliver exceptional service experiences (Cormany & Baloglu, 2011; de Vries & Huijsman, 2011). It encompasses service delivery management, order process management, and overall service process improvement. By focusing on key performance indicators and leveraging human resources effectively, service providers can enhance service quality, customer satisfaction, and overall operational efficiency.

2.10.7 Information and technology management process

Information and technology management plays a vital role in service supply chain management by enabling efficient data handling, information sharing, and technology utilization. It involves various activities such as sorting customer demand, sharing information within the supply chain, establishing job expectations, shaping service scope, and required skills, and gathering customer feedback (Ellram et al., 2004; Boon-itt et al., 2017).

One of the key challenges in service supply chain management is addressing the uncertainty and unpredictability of customer demand. Information and technology management helps overcome this challenge by collecting, controlling, and categorizing historical data and real-time information (Boon-itt et al., 2017). By analyzing this data, service providers can gain insights into customer preferences, demand patterns, and market trends, enabling them to make more informed decisions regarding capacity planning, resource allocation, and service customization (Boon-itt & Pongpanarat, 2011; Boon-Itt et al., 2017; Cho et al., 2012).

Effective information and technology management also promotes collaboration and coordination within the supply chain. It allows for seamless communication and information sharing among different stakeholders, including service providers, suppliers, and customers (Boon-Itt et al., 2017; Hussain, Khan, & Al-Aomar, 2016). This collaboration enhances operational effectiveness,

enabling faster response times, better coordination of activities, and improved overall supply chain performance (W. Liu et al., 2019).

Furthermore, information and technology management support decision-making processes by providing accurate and up-to-date information. It helps establish job expectations and define the required skills and competencies for service personnel (Boon-itt et al., 2017). By equipping service providers with the necessary information and technology tools, they can better meet customer needs, optimize service processes, and deliver high-quality services (Selviaridis & Norrman, 2014; Somabutr et al., 2020).

Customer feedback is an essential component of information and technology management. It enables service providers to gather insights into customer satisfaction, preferences, and areas for improvement (B. Wang, Kang, Childerhouse, & Huo, 2018). This feedback can be used to identify service gaps, refine service offerings, and enhance customer experiences.

Information and technology management in service supply chain management involves sorting customer demand, sharing information within the supply chain, establishing job expectations, shaping service scope, and required skills, and gathering customer feedback. By effectively managing information and technology, service providers can address the uncertainty of customer demand, promote collaboration within the supply chain, drive operational effectiveness, and make informed decisions to meet customer needs and expectations. Table 10 shows the definitions from several references and SSC dimensions explanation

Table 10 Seven Service Supply Chain Management constructs

Construct	Definition	Reference
1. Demand management process	The capabilities in estimating forecasts and managing customer demand by applying the information for accurate demand planning and shaping service capacity.	Wang et al. (2015), Boon-itt et al., (2017), Ellram et al., (2004), Mabert, (1982), Mehrparvar et al., (2014), Boon-itt & Pongpanarat, (2011),
2. Capacity and resource management process	The competence in balancing demand from customers and firm's service capacity at the optimum capacity.	Giannakis (2011), Boon-itt et al., (2017), Mabert, (1982), Baltacioglu et al.,(2007), Cho et al., (2012), Ellram et al., (2004), Boon-itt & Pongpanarat, (2011), Mehrparvar et al., (2014),
3. Customer relationship management process	The capability in interacting with internal firms and customers, creating the customer demand and developing long-term customer relationship by using real-time information technology.	Boon-itt et al., (2017), C ho et al., (2012), Boon-itt & Pongpanarat, (2011), Ellram et al., (2004), Baltacioglu et al.,(2007), Sampson & Spring, (2012), Mehrparvar et al., (2014), Wang et al. (2015),
4. Supplier relationship management process	The capability to manage and maintain relationship between firms and its suppliers. Supplier relationship management is the core process for every business which supports, plans, sources material, and coordinates with suppliers.	Boon-itt et al., (2017), Chopra & Meindl, 2004, Baltacioglu et al.,(2007), Wang et al. (2015), Zhang et al., (2011), Mehrparvar et al., (2014), Boon-itt & Pongpanarat, (2011), Giannakis (2011)
5. Order process management process	The competence in getting orders from customers, examining the order status and interacting with customer.	Boon-itt et al., (2017), Lambert et al., (1998), Mehrparvar et al., (2014), Giannakis (2011),
6. Service performance management process	The competence in managing, improving the performance of service process and fulfilling the customer requirement.	Boon-itt et al., (2017), Baltacioglu et al., (2007), Boon-itt & Pongpanarat, (2011), Ellram et al., (2004), Mehrparvar et al., (2014),
7. Information and technology management process	The competence in sorting customer demand, sharing information among the firm supply chain, establishing expectation, shaping the scope of job description, service and required skills for service firm, and following up the customer feedback about service.	Boon-itt et al., (2017), Boon-itt & Pongpanarat, (2011), Ellram et al., 2004, Mehrparvar et al., (2014),

Source: author

2.11 Service Supply Chain Management (SSC) performance measurements

The measurement of service performance poses a significant challenge due to its inherent complexity, often exceeding the difficulty of assessing product functionality (Boon-Itt et al., 2017; Cho et al., 2012; de Vries & Huijsman, 2011). This complexity stems from the fact that each organization possesses a distinct service operation, making the creation of standardized models for service supply chain performance measurement an intricate endeavor (Sampson & Froehle, 2006). Furthermore, the output of services is difficult to evaluate and scrutinize for quality before delivery to the customer, often necessitating post-consumption evaluation (Mehrparvar, 2014). Additionally, the characteristics of services – simultaneity, perishability, heterogeneity, and intangibility – further complicate the formulation of a standard performance measurement for the service supply chain (Giannakis, 2011; Hunter-Jones et al., 2020; Hussain et al., 2016; W. Liu et al., 2019).

Notwithstanding these challenges, numerous scholars have endeavored to identify viable performance measurements for service supply chain management. For instance, Giannakis (2011) proposed that the SCOR model, traditionally used in manufacturing, could be adapted to measure service supply chain performance. Given that the SCOR model encapsulates planning, sourcing, making, delivering, and returning processes, Giannakis posits that the "make" element could be replaced with a "design" process to reflect the customization required in service delivery.

Similarly, Mehrparvar et al. (2014) proposed indicators to measure performance in each process of the service supply chain, while Cho et al. (2012) offered a framework for measuring the performance of service supply chain management. In another contribution, Boon-itt et al. (2017) developed and validated Service Supply Chain Measurement scales using the Q-sort approach to refine the constructs of the service supply chain.

Despite these various approaches, a common thread in service supply chain efficiency measurement centers around capacity and resource management, information flows, resource flexibility, cash flow management, and service performance (Sengupta et al., 2006; Ellram et al., 2004).

In this section, a literature review has been conducted on service supply chain performance measurements. The primary focus has been on identifying and presenting these measurements

based on the studies conducted by Cho et al. (2012) and Boon-itt et al. (2017), as they provide comprehensive performance measurements for each process, directly relating to the inputs and outputs of the service supply chain.

2.11.1 Demand management performance measurements

The process of demand management, a fundamental operation within the service supply chain, is centred around the careful estimation and astute management of customer demand. This process employs the use of contemporary and relevant information, gathered meticulously from customer requirements (Cho et al., 2012).

Demand management plays an indispensable role in the service supply chain, acting as the primary mechanism responsible for forecasting and planning the allocation of resource capacity (Mehrparvar et al., 2014). These resources can range from human capital, such as service providers and customer service representatives, to technological infrastructure, like customer relationship management systems or data analytics tools.

Efficient demand management is paramount in ensuring that resources are optimally utilized, that there are minimal instances of service failure, and that customer satisfaction is maintained (W. Liu et al., 2019). In industries where service provision is instantaneous, such as in hospitality or healthcare, precise demand management becomes even more critical.

Furthermore, it contributes to the effective coordination of other service supply chain processes, such as capacity and skills management, customer relationship management, and service delivery management (Scott E. Sampson & Money, 2015; Stentoft Arlbjörn, Vagn Freytag, & de Haas, 2011). Effective demand management can help in minimizing the service lead time, enhancing service reliability, and providing a consistent and superior service experience to customers.

When considering the performance measurement of demand management, it is important to establish appropriate metrics that reflect the efficiency and effectiveness of the process (Altin et al., 2018). These performance measurements can serve as vital indicators of how well demand management is fulfilling its role within the service supply chain. In the context of this discussion, the specific performance metrics related to demand management are outlined in the subsequent Table 11.

These performance metrics are essential tools for continuous improvement, enabling the identification of potential bottlenecks or inefficiencies within the demand management process. They allow for informed decision-making, guiding adjustments to resource allocation or demand forecasting methodologies, and thus contributing to the overall enhancement of service supply chain performance.

Table 11 Demand management performance measurements

Performance measurements	References
1. Forecast accuracy	Cho et al., 2012; Baltacioglu et al., 2007; Ellram et al., 2004; Chopra & Meindl, 2004; Mehrparvar et al., 2014; Boon-itt et al., 2017; Boon-itt & Pongpanarat, 2011
2. matching customer requirements with firm capacity	Ellram et al., 2004; Mehrparvar et al., 2014; Boon-itt & Pongpanarat, 2011; Boon-itt et al., 2017;
3. Simulating the customer demand and provided services	Boon-itt & Pongpanarat, 2011; Boon-itt et al., 2017;

2.11.2 Capacity and resources management performance measurements

Capacity and resource management strategies form the backbone of an organization's service supply chain performance. The complex task requires a comprehensive understanding of the organization's capabilities and a careful orchestration of resources to align with customer demands (Liang, 2015).

To ensure the efficient utilization of resources, organizations often adopt resource leveling techniques. These techniques aim to evenly distribute the workload among employees while considering their respective skills, experience, and work hours (Laosirihongthong, Adebajo, Samaranayake, Subramanian, & Boon-itt, 2018; Chubing Zhang, Wang, Cui, & Han, 2020; Zubairu, Dinwoodie, Govindan, Hunter, & Roh, 2021). Furthermore, to facilitate this process, organizations deploy technology-driven solutions like Enterprise Resource Planning (ERP) systems and workforce management software (Aldayel, Aldayel, & Al-Mudimigh, 2011). These

solutions provide real-time visibility into resource availability and capacity, enabling better scheduling and allocation of resources.

When it comes to measuring the performance of capacity and resource management, various metrics are employed. Some of the key performance indicators (KPIs) include resource utilization rate, customer satisfaction, service level agreement (SLA) compliance, workforce productivity, and service delivery efficiency (Ahani et al., 2021; Baashar et al., 2020; Olya & Gavilyan, 2017).

Resource Utilization Rate provides insights into how effectively an organization is using its resources. A high utilization rate signifies efficient use of resources, whereas a low rate might indicate overcapacity or under-utilization. Customer Satisfaction is a critical metric that gauges the effectiveness of capacity and resource management from a customer's perspective. It measures the extent to which the service provided meets or exceeds customer expectations (Saccani et al., 2007; Scott E. Sampson, 2000).

Service Level Agreement (SLA) Compliance measures the percentage of service requests that are resolved within the agreed time frame (Chan & Gao, 2021). A high compliance rate indicates effective resource allocation and scheduling, ensuring timely service delivery. Workforce Productivity assesses the output produced by employees relative to their input. This metric provides insights into the efficiency of the workforce and helps identify areas of improvement.

Service Delivery Efficiency measures the ratio of output (service delivered) to input (resources used). This metric evaluates the effectiveness of capacity and resource management in terms of generating value for both the organization and its customers (Berry, 2020). Continuous tracking and evaluation of these metrics help in identifying performance gaps, driving strategic decisions, and enhancing the overall efficiency of the service supply chain (Baashar et al., 2020; Selviaridis & Norrman, 2014). By paying attention to these metrics, organizations can make informed decisions to improve their capacity and resource management strategies, thereby enhancing service quality and customer satisfaction. In the context of this discussion, the specific performance metrics related to capacity and resource management are outlined in the subsequent Table 12.

Table 12 Capacity and resource management performance measurements

Performance measurements	References
1. Intangible resource allocation (e.g. service, skilled labour, experience, time, information)	Cho et al., 2012; Baltacioglu et al., 2007; Ellram et al., 2004; Chopra & Meindl, 2004; Mehrparvar et al., 2014; Boon-itt et al., 2017; Boon-itt & Pongpanarat, 2011
2. Tangible resource allocation (e.g. physical goods, facilities, capital)	Ellram et al., 2004; Boon-itt et al., 2017; Boon-itt & Pongpanarat, 2011; Chopra & Meindl, 2004
3. The ability of tracking uncertainty demand with service capacity	Cho et al., 2012; Boon-itt et al., 2017; Boon-itt & Pongpanarat, 2011; Maull et al., 2012
4. The ability to adjust the service capacity with the optimum point	Cho et al., 2012; Boon-itt et al., 2017; Boon-itt & Pongpanarat, 2011
5. The ability to provide service to customer with least waiting time	Boon-itt & Pongpanarat, 2011

2.11.3 Customer relationship management performance measurements

Customer relationship management (CRM) is an integral component in the operation and growth of any organization (J.-H. Wang et al., 2020). Its importance is magnified in today's dynamic business environment where customer expectations continue to evolve rapidly. Effective CRM demands a strong network of internal communication within the organization and a deep understanding of the customers' needs and preferences (Chubing Zhang et al., 2020).

A successful CRM process involves using real-time information technology to interact with customers, understand their needs, and influence their demand (Z. Liu et al., 2022). By effectively leveraging technology, firms can offer personalized experiences, respond quickly to customer queries, and address any issues promptly, which in turn promotes customer satisfaction and loyalty (Fujita & Sato, 2022).

Moreover, CRM helps an organization manage its tangible and intangible resources better. For instance, by analyzing customer behavior data, firms can align their resources more effectively to meet customer demand and expectations (B. Wang et al., 2018). This is particularly crucial in a service-oriented business where meeting and exceeding customer expectations can significantly influence the firm's success.

The development of long-term customer relationships is another crucial aspect of CRM. Building and maintaining strong relationships with customers can lead to customer loyalty, repeat business, and even new business through referrals (Gorane & Kant, 2015; Guerola-Navarro, Gil-Gomez, Oltra-Badenes, & Sendra-García, 2021; Hunter-Jones et al., 2022). Additionally, having a close relationship with customers also means getting regular feedback, which can be invaluable for improving services and processes within the organization.

Measuring the effectiveness of CRM processes is equally important. Performance metrics in CRM might include customer satisfaction scores, customer retention rates, the number of new customers acquired, the value of sales per customer, and the speed of handling customer complaints or queries. Each of these measurements provides a snapshot of how well the organization is doing in managing its relationships with its customers.

These measurements, summarized in Table 13, serve as a critical tool for strategic decision-making. They offer a clear picture of how effective the CRM process is, highlight areas that need improvement, and help ensure the organization's CRM strategy evolves in line with customer expectations and market dynamics.

Overall, CRM is a strategic process that is pivotal for the sustained success of an organization. Effective CRM ensures that customer demands are not only met but exceeded, leading to increased customer loyalty and ultimately, growth in business.

Table 13 Customer relationship management performance measurements

Performance measurements	References
1. Long-term customer relationship maintenance.	Wang et al., 2015; Cho et al., 2012; Boon-itt & Pongpanarat, 2011; Mehrparvar et al., 2014; Boon-itt et al., 2017; Baltacioglu et al., 2007; Ellram et al., 2004; Giannakis, 2011; Sampson & Froehle, 2006; Sakhuja & Jain, 2012
2. The ability to focus on individual customer need and satisfaction.	Cho et al., 2012; Boon-itt & Pongpanarat, 2011; Ellram et al., 2004; Wang et al., 2015
3. The ability to communicate or advertise information to customers.	Boon-itt & Pongpanarat, 2011; Cho et al., 2012; Baltacioglu et al., 2007
4. The ability to create the effective relationship with customer by brand royalty.	Ellram et al., 2004; Boon-itt & Pongpanarat, 2011; Cho et al., 2012
5. The ability to categorise and prioritise the group of customers.	Boon-itt & Pongpanarat, 2011; Sampson & Froehle, 2006
6. The ability to maintain relationship with customer after sales	Boon-itt & Pongpanarat, 2011; Wang et al., 2015; Baltacioglu et al., 2007; Sampson & Froehle, 2006
7. The ability to trace the customer feedback improve the service supply chain	Wang et al., 2015; Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007; Sampson & Froehle, 2006

2.11.4 Order Process management performance measurements

Order process management forms a crucial aspect of any organization's operations (Hunter-Jones et al., 2022). It involves receiving, interpreting, and fulfilling customer orders. This process necessitates prompt response to customer demand, examination of order status, effective communication with customers, and ensuring timely and accurate order delivery (Lambert et al, 1998, as cited in Mehrparvar et al., 2014).

The implementation of order process management can take place through multiple avenues, including in-store purchases, reservations, or digital applications. These channels are chosen based on the nature of the business and customer preferences (Cho et al., 2012).

One of the crucial tasks of order process management is accurately interpreting customer orders and their specific needs (Maestrini et al., 2018). Every detail of the order is converted into useful information that is fed into the operational procedures of the business. This task requires careful attention to detail to avoid misinterpretations and errors (Baltacioglu et al., 2007).

The benefits of effective order process management are numerous. It can significantly reduce service order lead times, resulting in faster delivery of services to customers (Selviaridis & Norrman, 2014). Additionally, it also aids in effectively managing the service cycle time, thereby improving the efficiency of the entire process. Moreover, it streamlines the customer service order paths, making the process more user-friendly and improving customer experience (Cho et al., 2012).

In terms of performance metrics for order process management, a variety of factors can be considered (Selviaridis & Norrman, 2014). These might include order accuracy rate, order cycle time, the percentage of on-time deliveries, customer satisfaction rate, and the rate of return or canceled orders. Each of these metrics provides valuable insights into the effectiveness of the order process management (Cho et al., 2012).

These metrics, set to be displayed in Table 14, are integral in assessing the efficiency and effectiveness of order process management. They help in strategic decision-making, identifying potential areas for improvement, and enhancing the overall performance of the process. Through continuous measurement and improvement, businesses can optimize their order process management, leading to improved customer satisfaction and increased operational efficiency.

Table 14 Order process management performance measurements

Performance measurements	References
1. The ability to facilitate customer order entry correctly for every steps to operations.	Cho et al., 2012; Boon-itt & Pongpanarat, 2011; Giannakis, 2011
2. The ability to manage the reservation system efficiently.	Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007;
3. The ability to interact with customer with courtesy.	Boon-itt & Pongpanarat, 2011; Cho et al., 2012
4. The ability to create the effective relationship with customer by the service order entry method	Wang et al., 2015; Cho et al., 2012; Boon-itt & Pongpanarat, 2011; Mehrparvar et al., 2014; Boon-itt et al., 2017; Giannakis, 2011; Sakhuja & Jain, 2012
5. The ability to improve the smooth customer service order path	Cho et al., 2012; Boon-itt et al., 2017
6. The ability to provide the least service order leadtime	Cho et al., 2012; Boon-itt et al., 2017; Boon-itt & Pongpanarat, 2011

2.11.5 Supplier relationship management performance measurements

Supplier relationship management refers to the practice of strategically planning and managing interactions with suppliers, which forms the foundation of an effective supply chain. It involves managing and developing the relationships with suppliers that provide the raw materials, products, and services necessary for your business operations (Chopra & Meindl, 2004).

This process is a central pillar of a company's operations and can significantly impact its overall efficiency and success. It serves as a critical link between the planning, sourcing, and management of resources, and operational processes. The ability to effectively manage supplier relationships, therefore, influences other areas of business such as capacity and resource management and order process management (Baltacioglu et al., 2007).

Maintaining service-level agreements with suppliers is a crucial aspect of this process, as it ensures the availability and timely delivery of resources, helping businesses meet customer orders efficiently. Enhancing supplier relationship management performance requires a multifaceted approach. Firms need to foster robust relationships with their suppliers, which involves consistent communication, mutual trust, and cooperative problem-solving (Zhang et al., 2011). Additionally, firms need to establish transparent information sharing protocols with their suppliers. This can facilitate better coordination in service development, sourcing, and planning across the supply chain, leading to improved operational efficiency (Chopra & Meindl, 2004).

Performance indicators for supplier relationship management play a key role in assessing the efficiency of this process (Boon-itt & Pongpanarat, 2011; Boon-Itt et al., 2017). These could include metrics such as supplier reliability, cost-effectiveness, the quality of materials or services provided, responsiveness to issues, and compliance with contracts or agreements. The precise metrics used can vary depending on the specific nature and needs of the business (Maestrini, Luzzini, Maccarrone, & Caniato, 2017; Chun Zhang, Viswanathan, & Henke Jr, 2011).

The outlined performance indicators, as featured in Table 15, provide crucial insights for evaluating the effectiveness of supplier relationship management. They support strategic decision-making, facilitate the identification of potential improvements, and aid in enhancing the overall supply chain efficiency. By continuously tracking these metrics, organizations can identify areas of strength and weakness in their supplier relationships and implement targeted strategies to improve supplier performance and overall supply chain effectiveness.

Table 15 Supplier relationship management performance measurements

Performance measurements	References
1. The ability to create long-term relationship with suppliers.	Cho et al., 2012; Boon-itt & Pongpanarat, 2011; Chopra & Meindl, 2004; Mehrparvar et al., 2014
2. The ability to maintain the close relationship with suppliers.	Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007; Cho et al., 2012;
3. The ability to assess the supplier performance.	Mehrparvar et al., 2014; Cho et al., 2012; Boon-itt & Pongpanarat, 2011; Sakhuja & Jain, 2012
4. The ability to prioritise the key suppliers to increase the supply chain quality.	Boon-itt et al., 2017; Cho et al., 2012; Boon-itt & Pongpanarat, 2011

2.11.6 Service performance management performance measurements

Service performance management represents the capacity to effectively manage and enhance the performance of a firm's service (Maestrini et al., 2017; Chun Zhang et al., 2011). This process involves careful monitoring and assessment at all levels of an organization as the quality of service needs to be measured against the customer's satisfaction after consumption (Boon-itt et al., 2017).

Key components of service performance management encompass a wide range of activities. This includes the assessment of service performance and the customer experience, which involves gathering and analyzing feedback to identify areas of improvement (Cho et al., 2012). It's crucial to ensure that service delivery meets or even exceeds customer expectations to promote customer loyalty and positive word-of-mouth. Another crucial aspect is capacity planning, which requires accurately forecasting customer demand to ensure sufficient capacity is available to meet this demand. This process can involve managing staff levels, scheduling, and managing resources effectively.

Furthermore, adjusting the service schedule according to customer demand and business needs is a critical factor (Baltacioglu et al., 2007; Giannakis, 2011; T. J. Lee et al., 2020). This requires a flexible and responsive system that can adapt to changes in demand to ensure efficient service delivery.

Service performance management involves maintaining strict control over service quality (de Vries & Huijsman, 2011). This requires the development and enforcement of quality standards and processes and regular monitoring to ensure these standards are met consistently.

To continually improve service performance management, it is crucial to develop strategies based on performance indicators. These indicators, which will be further elaborated in Table 16, serve as an invaluable tool in evaluating the efficiency and effectiveness of service performance management. They provide insights that support strategic decision-making, identify areas of improvement, and facilitate continuous enhancement of service performance.

These performance metrics might include customer satisfaction ratings, service delivery time, adherence to service standards, and the efficiency of resource utilization. Each of these indicators provides valuable insights into different aspects of service performance and can guide efforts to enhance service delivery, improve customer satisfaction, and ultimately, drive business growth. Service performance management is the ability to manipulate and improve the performance of firm service (Baltacioglu et al., 2007). This process leads attention from every level of firms because of service quality need to be measured between customer satisfaction and service performance after consuming (Boon-itt et al., 2017). Service performance management consists of assessing service performance and customer experience, planning enough service capacity to serve the customer, adjusting the service schedule, and controlling the service quality. These can be developed to improve performance and meet customer expectations (Baltacioglu et al., 2007; Ellram et al., 2004; Boon-itt et al., 2017; Wang et al., 2015). In terms of providing the performance measurement of service performance management process, indicators are illustrated in Table 16 below.

Table 16 Service performance management performance measurements

Performance measurements	References
1. The ability to have the team management skill.	Cho et al., 2012; Boon-itt & Pongpanarat, 2011;
2. The ability to provide the service flexibility. (e.g., service volume, speed, lead time and specification)	Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007; Cho et al., 2012; Boon-itt et al., 2017
3. Range of services	Cho et al., 2012; Mehrparvar et al., 2014
4. The ability to administer pre- and post-process service.	Mehrparvar et al., 2014, Cho et al., 2012
5. having concrete or rubric score for service performance evaluation (e.g. profit margin, labor productivity, customer satisfaction, facilities, average customer spend per time, employee turnover ratio)	Cho et al., 2012, Wang et al., 2015
6. The ability to propose the service standardisation	Boon-itt et al., 2017; Ellram et al., 2007
7. The ability to deliver the accurate service to customer	Boon-itt et al., 2017; Ellram et al., 2007

2.11.7 Information and Technology management performance measurements

The competence in information and technology management lies in effectively discerning customer demand, facilitating information sharing within the supply chain, establishing expectations, defining the scope of service offerings, and required skills within the service firm, and monitoring customer feedback (Boon-itt & Pongpanarat, 2011; Cho et al., 2012; Chung-Herrera, 2007).

Literature on this topic largely agrees that information and technology management play crucial roles in maintaining up-to-date customer demand insights, enhancing information exchange, meeting expectations, shaping the service scope, managing skilled workforce, and providing performance feedback (Ellram et al., 2004; Boon-itt et al., 2017).

Information and technology management aids in the effective administration, coordination, and collaboration within the supply chain, thereby improving service performance and operational processes (Boon-itt et al., 2017; Cho et al., 2012; Chopra & Meindl, 2004). The adoption of information technology acts as a vital facilitator, enabling sound decision-making and promoting necessary information exchange both within and between organizations (Baltacioglu et al., 2007).

Moreover, assessing the performance of information and technology management processes can aid service supply chains in supporting and attaining a competitive edge within their firm. The performance measurements associated with this process are presented in Table 17. These measurements offer critical insights for strategic decision-making and identify potential areas of improvement, supporting the ongoing enhancement of information and technology management within the service supply chain.

Table 17 Information and technology management performance measurements

Performance measurements	References
1. The ability to keep up-to date information for firm's supply chain.	Cho et al., 2012; Boon-itt & Pongpanarat, 2011;
2. The ability to adopt the new technology to support firm and customer demand.	Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007; Cho et al., 2012; Boon-itt et al., 2017; Wang et al., 2015
3. The ability to access information timely any time by firm technological device and networks.	Boon-itt & Pongpanarat, 2011; Ellram et al., 2004; Chopra & Meindl, 2004; Mehrparvar et al., 2014
4. The ability to create the concrete and effective information network among intra- and inter-firms.	Baltacioglu et al., 2007; Boon-itt & Pongpanarat, 2011;
5. The ability to provide useful information on technology platform with customers.	Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007; Wang et al., 2015; Chopra & Meindl, 2004; Mehrparvar et al., 2014
6. The ability to provide useful information on technology platform with suppliers.	Boon-itt & Pongpanarat, 2011; Chopra & Meindl, 2004; Mehrparvar et al., 2014
7. Firm can apply the information and technology for decision making.	Ellram et al., 2004; Boon-itt & Pongpanarat, 2011; Wang et al., 2015
8. The ability to track the accurate data within firm supply chain.	Boon-itt & Pongpanarat, 2011; Baltacioglu et al., 2007; Ellram et al., 2004; Ellram et al., 2007

In this section, it is noteworthy to mention that current research appears to point towards an existing gap in the study of performance measurements in service supply chain management. Many scholars have devoted substantial effort to discussing the context of service supply chain management, making correlations between performance measurements and scale measurements. Notable contributions in this field have been made by researchers such as Boon-itt & Pongpanarat (2011), Boon-itt et al. (2017), and Mehrparvar et al. (2014).

2.12 Discussion of Research gap based on literature review

While the author's understanding reveals that there is no universally agreed-upon definition of medical tourism currently, it also uncovers an explicit need for more comprehensive exploration and research within this field to reach a widely accepted definition. Furthermore, a substantial scarcity of empirical research is noticeable, particularly within Thailand's context. Although the medical tourism literature has grown since the early 2000s with a focus on developing nations, the exploration into how performance metrics can boost service quality, efficiency, and competitiveness within Thailand's medical tourism sector remains limited, especially from a supply-side chain (SSC) perspective (Fetscherin & Stephano, 2016).

This reveals a crucial research gap that needs to be filled.

- I. Based on the recent literature review on medical tourism, navigating the medical tourism industry successfully necessitates a fine balance between providing high-quality medical services and offering the appeal of a healing vacation. As many researchers progress deeper into the new millennium, this industry presents promising opportunities intertwined with various challenges such as the lack of clear business models, complex industry processes, supply chain intricacies, and issues related to capacity and resource utilization. The highly competitive market landscape further accentuates these challenges, demanding continuous improvements in healthcare quality (Ajmera & Jain, 2019a, 2019b).
- II. When it comes to supply chain management (SCM), it becomes clear that most of the existing research is overwhelmingly oriented towards the manufacturing sector. This leaves a noticeable research gap in the service sector, largely due to the unique characteristics and intricacies inherent to it (Sengupta et al., 2006). Notably, these complexities have led to an under-exploration of this sector (Giannakis, 2011; Akkermans & Vos, 2003). Given the essential role that service sectors play in the economies of many countries, there is an immediate call for academics and professionals to direct more of their focus towards the realm of Service Supply Chain Management (SSCM). It is imperative that this area of study receives its due attention, given its significance and potential impact on the service sector at large. The SSCM literature is on the rise but still leaves considerable room for development. Areas of focus include unifying conceptual definitions (Ellram et

al., 2004; Baltacioglu et al., 2007), devising robust measures for SSC process capabilities (Boon-itt et al, 2017), and gathering real-world case studies on SSCM implementation (Giannakis, 2011). The field is ripe for comprehensive research on SSCM that can provide invaluable insights, bridge existing knowledge gaps, and foster a deeper understanding of the industry.

- III. Within the realm of Thai medical tourism, research on service quality determinants, decision-making motivations, and performance evaluation methodologies is plentiful. Yet, there is a significant research gap concerning the roles of SSC performance measurements. The focus has been predominantly on individual elements of the industry rather than a holistic examination of the SSC's efficiency and effectiveness in delivering high-quality care to international patients. Additionally, a shortage of theoretical knowledge exists about the medical tourism supply chain context. Despite the abundant studies on Supply Chain Management (SCM), most of the research has been conducted in the manufacturing sector. There is an apparent unexplored gap in the Service Supply Chain Management (SSC) (Baltacioglu et al., 2007; Ellram & Murfield, 2019).
- IV. While the medical tourism sector has received considerable attention, the specific application of performance measurements in this sector remains largely unexplored. There is a clear opportunity for further research into the development of these measurements, which could prove instrumental in enhancing the performance and competitiveness of the medical tourism industry in Thailand. Furthermore, the application of service supply chain management practices in the context of the Thai medical tourism industry has received limited attention. Therefore, this research aims to fill this gap by investigating the roles of SSC performance measurements and their significance in enhancing the Thai medical tourism industry's performance.

2.13 Summary of Chapter 2

This chapter began with an in-depth look at medical tourism, starting with the task of defining it. The unique aspects of medical tourism were studied, as well as the different types of medical tourists. This chapter lays a solid theoretical foundation of the many participants in medical tourism, such as facilitators, tour operators, travel agents, healthcare providers, hospitals, and government bodies. The author also underscored the importance of accreditation organizations as the Joint Commission International (JCI). The impact of globalization on the medical tourism industry was examined, and key factors for success were identified. This part of the study was important to understand the global and competitive elements that affect medical tourism.

Moving onto Supply Chain Management (SCM), the author compared the structure of traditional SCM with Service Supply Chain Management (SSCM). The evolution, dimensions, and performance measurements of SSCM were discussed. These sections highlighted the differences and complexities of managing supply chains in service-focused industries, such as medical tourism. This chapter concluded with a discussion on the gaps in current research. These gaps include the need for a widely accepted definition of medical tourism, a lack of detailed research, particularly in Thailand, and a need for more research into how SSCM performance measurements can improve service quality, efficiency, and competitiveness in medical tourism.

In summary, this chapter aimed to analyze the complexities of medical tourism and SSCM, providing a comprehensive understanding to lay the groundwork for future research. The author aims to address these research gaps by examining the role of SSCM in medical tourism, particularly in Thailand, and proposing performance measurements. This effort could contribute to improved service quality, efficiency, and competitiveness, providing guidance for future research and industry practitioners. Then, the next chapter discusses and justifies the theoretical foundation and framework development in this study.

Chapter 3

Theoretical foundation and framework development

3.1 Introduction

This chapter introduces the conceptual architecture of a medical tourism supply chain model, with a focused examination of the specific roles and importance of service supply chain performance measurements. It commences with the exploration of potential theoretical foundations, chiefly the system theory and the Unified Service Theory (UST). The research inquiries are formulated based on the comprehensive literature review and the interconnectedness discerned within the proposed medical tourism supply chain.

3.2 Theoretical Development

Theoretical foundation is a vital component of any dissertation. It serves as a roadmap, outlining the research structure and informing how the author approaches and tackles the research topic (Grant & Osanloo, 2014). Furthermore, Grant & Osanloo (2014) maintained that there is not a definitive right or wrong when choosing a theoretical framework for a dissertation. However, they emphasized that the author should conduct further studies to discern which theories are most suitable and commonly employed within their specific discipline. Accordingly, in this study, the author established the problem statement and rationale of the study in Chapter 1 and undertook an extensive review of existing literature in Chapter 2. This process aimed to discern and select the most appropriate theories for this exploratory study.

3.2.1 System theory

Basically, system theory has been the important theoretical foundation for explaining the relationship of medical tourism industry (Ko, 2011). System refers to the comprehensive view of all components in one community to form the unified goals (Bertalanffy et al., 1951; Goeldner & Ritchie, 2012). A system theory was firstly adopted in the biology science in the middle of 19th century by Ludwig von Bertalanffy. He was the first person to suggest the difference between ‘closed’ and ‘open’ systems. The ‘closed system’ aims to study about the internal interaction and influences within its system. This system is independent from the external environment. Whereas the ‘open system’ requires the interaction and influences from external environment and allows

the external properties to involve. In addition, Bertalanffy et al. (1951), biologists, are the pioneers of a system theory or system approach which is suggested about the phenomena of different interaction between system's component and system's sub-components in biology perspective. There are five main points of the system theory including firstly, total system is not about the accumulation of subcomponents only but also about the results and effects of the interaction of sub-components in the system. Secondly, total system may consist of many levels of hierarchy which are connected to each other sub-component. Thirdly, total system requires to investigate as the whole a system context and cannot spot on only some point of the total system. Fourthly, total system's relationship and feedbacks are needed for consideration. Fifthly, it is crucial for social science to determine for both structure and process of the system (Bertalanffy et al., 1951).

Furthermore, a system theory is interdisciplinary approach by using in many fields such as biology, pure science, social science, management and so forth. Checkland (1981) was one of the key authors to highlight that all phenomena can be seen as a web of relationship and all systems have general patterns or structures with the origin of theory of Cybernetics. As Walker et al. (2014) point out from Checkland's study, top topics in social science and management which are applied by system approach such as operations management, RFID, and tourism (Goeldner & Ritchie, 2012; McIntosh, Goeldner, & Ritchie, 1995)

The tourism industry has the combination of several industries such as transportation, hotels, intermediaries, catering, and other industries and as the result, system theory is applied by many scholars (Goeldner and Ritchie, 2012; Leiper, 1979, 1995; Morrison, 2009; Woodside, 2009; Carlson, 1999). A system theory is considerable for identifying the medical tourism system. It is essential for understanding the connection and relationship among various components such as customers, suppliers, and other participant from many industries (Morrison, 2009; Goeldner and Ritchie, 2012).

Medical tourism industry has a comprehensive view including many processes, components and sub-components which cannot restrict the boundary or consider only a part of healthcare or tourism industries. System theory differs from the linear thinking because linear thinking is strongly based on rationality or logic, but system theory is focused on the multiple components and 'not only ... but also' concept or comprehensive view of interaction within the system (Ko, 2011). It is required to study systematically as the all-embracing systems for medical

tourism industry. Hence, using a system theory in this study may support the identification of studying about process, hierarchy, and overarching medical tourism system. The above discussion shows that the system theory could be apply to the explanation of medical tourism relationship and framework. The system theory not only relates the medical tourism supply chain framework but also presents the combination between service supply chain management performance measurements and medical tourism service qualities. Additionally, adopting system theory could help scholars and practitioners understand the big picture of medical tourism supply chain perspective.

3.2.2 Unified Service Theory (UST)

This study mainly focuses on the service supply chain perspective of the medical tourism industry. Medical tourism industry is unique and difficult to measure the performance without understanding of service system and its nature of this industry. Medical tourism consists of many participants from both healthcare and tourism industries. It means that this study needs to investigate from suppliers and customers' roles and feedback in medical tourism supply chain which leads to the application of Unified Service Theory (UST).

A Unified Service Theory (UST) was originally adopted in service operations management research by Scott E. Sampson (2000). His research interest involves in service and operations management which using customer feedback as inputs for quality improvement in service industry (Sampson, 2001). He was the key author to suggest the difference between traditional or manufacturing supply chain and service supply chain. Sampson (2001: p.5) defined The Unified Service Theory that

“With service, the customer provides significant inputs into the production process. With manufacturing, groups of customers may contribute ideas to the design of the product, however, individual customers' only part in the actual process is to select and consume the output. Nearly all other managerial themes unique to services are founded in this distinction.”

Additionally, Unified Service Theory (UST) has been defined as the bidirectional supply chain relationships which refers to the customers also play the supplier's role in the service industry or namely “Customer-supplier duality” concept (Sampson, 2000; Sampson & Froehle, 2006; Sampson & Spring, 2012). In Service Supply Chain perspective, customers provide the

integration of material, labor, preference, and information (Sampson & Spring, 2012). To illustrate the difference point from traditional supply chain and service supply chain, Table 18 below shows the example of inputs from customer in service business (Sampson, 2000; Sampson & Froehle, 2006).

Table 18 Input from customers in service business

Type of Service Business	Inputs from Customers
Medical	Sickness & Injuries
Delivery	Package, parcels
Consulting	Customer problems
Architecture	Design preferences
Education	Customer's mind, preference of subject
Government	Community issue and public problems
Dental care	Customer teeth problem

Source: Sampson (2000), Sampson & Froehle (2006), Sampson & Spring (2012)

To clarify the Unified Service Theory, main components are required to understand including *input*, *customer*, and *production process* (Sampson & Froehle, 2006). Firstly, '*input*' refers to something which may come from many sources and suppliers load to the system or production process such as raw material, work-in-process, personnel, capital, and information (Gaither & Frazier, 1999, p.15 cited in Sampson & Froehle, 2006). Moreover, '*customer inputs*' mean the inputs that are specified by customer (Davis & Heineke, 2005, p.7 cited in Sampson & Froehle, 2006). Secondly, '*customer*' is defined by the American Marketing Association (AMA) as "the actual or prospective purchaser of products or services" (Bennett, 1995, p.73 cited in Sampson & Froehle, 2006). In service industry, identifying customer is essential to understand the service nature of its process.

Therefore, Sampson & Froehle (2001, p. 28) suggested 'customer' as "the individuals or entities who determine whether or not the service provider shall be compensated for production". In this study, this may capture the concept of medical tourism industry as well in terms of decision-making ability, it can occur the complicated decision-making by more than one entity. For

example, who has the purchasing power or decision-making right for international healthcare? It might be the medical tourist or patient, who is the recipient of treatment. It may be the referred physician in the home country, who diagnoses and refers patient's case to another international hospital. It may be the insurance company, who considers about the coverage cost for healthcare and medical plan. Even if, it may be the medical tourist's companion, who takes responsible for accompanying the patient travelling across borders such as parents, friend, caretaker and medical tourism facilitator. Thirdly, '*production process*' is the unit of analysis in the Unified Service Theory. A process is the sequence of procedures or steps. Sampson & Froehle (2006, p.333) proposed and narrowed down the definition of production from Goldratt's study (1992, p.60) as "productions refer to only productive activities that contribute to throughput or sales, which is an elevated specification of the term production".

Following the importance of the Unified Service Theory, author considers the uniqueness of medical tourism industry with regards to the Unified Service Theory implication. Medical tourism is the combination between healthcare and tourism industries, which means that customer demand is essential as the key information or customer-input. Customer or medical tourist is the primary supplier to input the service process by themselves which refers to Sampson's study (2000) in the concept of customer being supplier as "Customer-supplier duality". Customer-supplier duality presents the bidirectional relationship of service supply chain, which means the production process can be communicated in two-way for effective communication.

As stated by the above discussion, the Unified Service Theory could be mainly applied to the creation of customer-supplier duality framework of medical tourism supply chain. The Unified Service theory (UST) not only notes the combination of bidirectional relationship within medical tourism supply chain from various participants but also identifies the service supply chain management constructs which are linked to performance measurement development to improve the service supply chain performance as well. Hence, using Unified Service Theory could help scholars and practitioners understand and investigate the service performance measurements in medical tourism supply chain.

3.3 Proposed Conceptual Framework

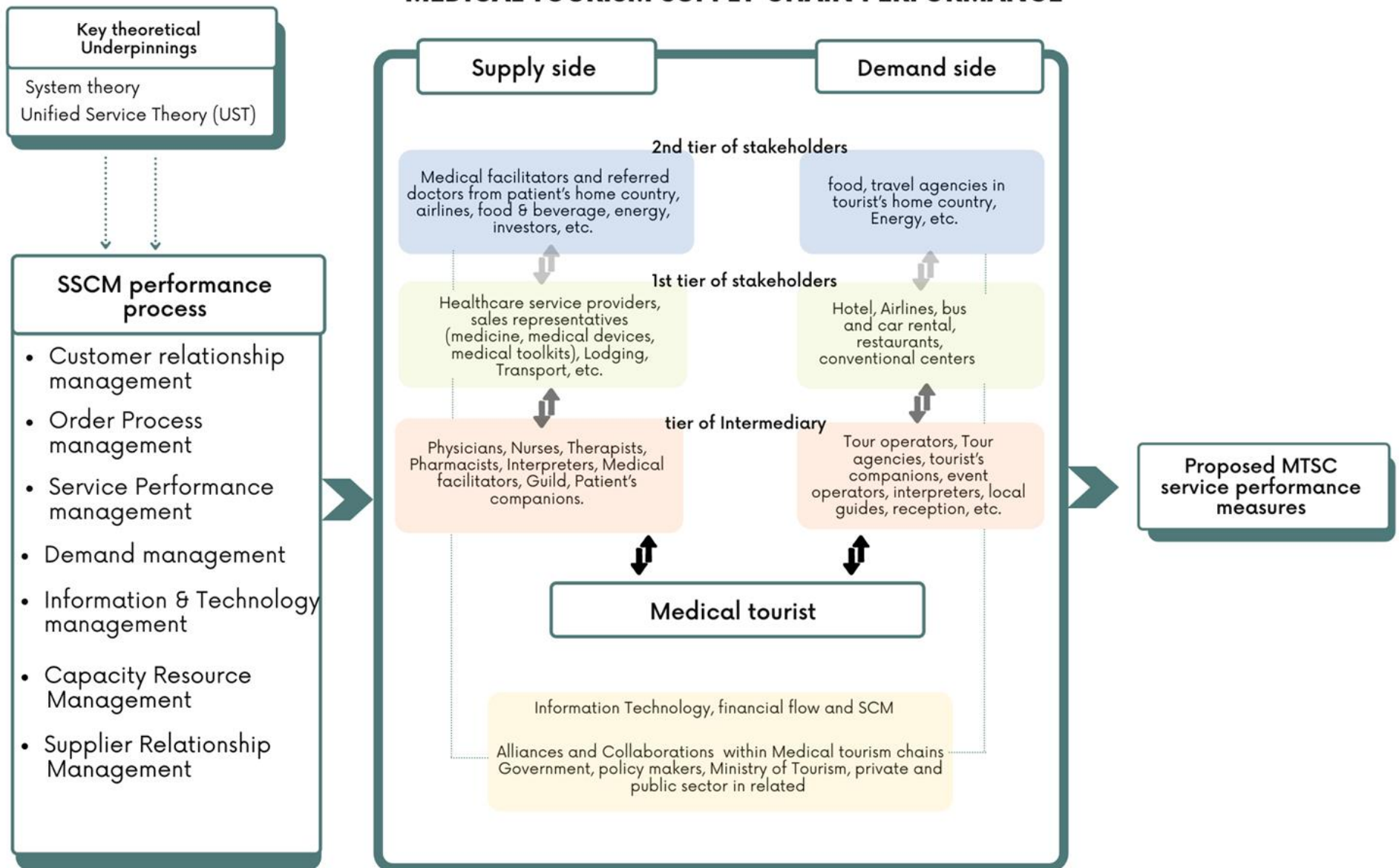
This section is devoted to the development of a conceptual model for this study, which involves integrating elements from the existing literature into a specific model featuring proposed measurements derived from an exploratory study. As Vapio et al., (2020) suggested, a theoretical framework provides a structure that enhances the understanding of theories. Meanwhile, a conceptual framework serves as a scaffolding to support the connection between concepts.

Because of the unique nature of the medical tourism industry, the author endeavors to find an appropriate theoretical foundation. As a result, the author proposes a perspective on medical tourism grounded in service supply chain management, influenced by the Unified Service Theory (UST) and systems theory. Systems theory is employed as a methodology for identifying and breaking down the medical tourism system into its core components. This approach is critical for scrutinizing the interactions and connections among a variety of actors such as customers, suppliers, and other participants spanning numerous industries, as depicted in Figure 20 (Morrison, 2009; Goeldner and Ritchie, 2012). The Unified Service Theory (UST) is invoked to articulate the bidirectional supply chain relationships, encapsulated in the concept of "Customer-supplier duality," where customers also act as suppliers in the service industry (Sampson, 2000; Sampson & Froehle, 2006; Sampson & Spring, 2012).

The nature of medical tourism as a service industry requires input from customers or medical tourists before initiating their journey. This aspect aligns with the bidirectional relationship framework put forth in Sampson's (2000) theory.

In structuring the medical tourism supply chain, the author positions medical tourists at the center, serving as a bridge between the healthcare and tourism industries under the customer-supplier duality concept. The supply chain, as illustrated in **Figure 20**, is organized into three tiers of suppliers who serve the needs of medical tourists: the 2nd tier supplier, the 1st tier supplier, and intermediaries. The classification of these tiers is based on their significance and respective roles within the medical tourism industry.

CONCEPTUAL FRAMEWORK FOR MEDICAL TOURISM SUPPLY CHAIN PERFORMANCE



Source: Author

Figure 12 Conceptual framework development

For the purposes of this study, the author segments the medical tourism supply chain into two parts: the supply side and the demand side. The supply side refers to those stakeholders operating behind the scenes to prepare or deliver services to medical tourists, including medical facilitators, referred doctors from the patient's home country, airlines, food and beverage providers, energy suppliers, and investors. The demand side, on the other hand, consists of those stakeholders who engage directly with medical tourists, such as food suppliers and travel agencies.

The inner tier or 1st tier contains stakeholders of similar importance in the chain. On the supply side, these include healthcare service providers, sales representatives, medical suppliers, lodging facilities, transport providers, among others. On the demand side, this group involves hotels, airlines, bus and car rental companies, restaurants, convention centers, and the like.

The closest tier to medical tourists, the intermediary tier, encompasses a range of stakeholders. On the supply side, this includes physicians, nurses, therapists, pharmacists, interpreters, medical facilitators, and tour guides. The demand side consists of tour operators, tour agencies, the tourist's companion, event operators, local guides, hotel reception, and so forth. Some stakeholders may be mentioned in both categories because they interact with both healthcare service providers and medical tourists.

Finally, based on the breakdown in Figure 20, the author defines the Medical Tourism Supply Chain (MTSC) as follows:

"The Medical Tourism Supply Chain is a network of suppliers and service providers primarily engaged in delivering medical treatments and tourism services to foreign visitors in a specific country or their chosen destination."

This definition recognizes the complex interplay of a broad range of participants such as foreign medical tourists, healthcare providers, and various entities from both the public and private sectors. It encapsulates the entire chain, from initial contact to the conclusion of the service delivery, mapping the interconnected journey that defines the medical tourism supply chain.

All elements within this proposed medical tourism supply chain were established and corroborated through a pilot study and detailed interviews. These investigative tools were instrumental in the development of the research questions. As the study progressed, the proposed

performance measurements for the service supply chain were further refined during the empirical phases. These measurements, both direct and indirect, are shaped by the overarching service supply chain strategy.

3.4 Research question development

The primary objective of this research is to explore the role and significance of service supply chain performance measurements in the Thai medical tourism industry, a rapidly evolving sector of growing global importance. The study contextualizes itself within the realm of service supply chain management and its applicability in the medical tourism industry, focusing, particularly on Thailand. A noteworthy gap has been identified in the current body of literature regarding this specific intersection of study.

This research gap pertains to an in-depth understanding of the roles and implications of service supply chain performance measurements in relation to the Thai medical tourism industry. This study seeks to provide insight into how these performance measurements can enhance service quality, operational efficiency, and the overall competitiveness of the industry within this unique national context.

The overarching aim of this research is to contribute to a more comprehensive understanding of service supply chain performance measurements within the medical tourism industry. It seeks to highlight how these measurements can be leveraged to enhance service quality, elevate operational efficiency, and foster competitive advantage within Thailand's medical tourism industry, situated in a global and increasingly competitive market.

With these considerations in mind, the central research question that encapsulates the essence of this research can be articulated as follows:

"What is the role and significance of service supply chain performance measurements in enhancing service quality, operational efficiency, and competitiveness within the Thai medical tourism industry?"

This research question is designed to address the identified gap in the current literature, within the specific context of Thailand's medical tourism industry. It provides a clear path for the

study, with a sharp focus on understanding and clarifying the importance of service supply chain performance measurements in this unique dynamic and globally significant industry.

3.5 Conclusion

This chapter presents the theoretical foundation of this study, drawing on systems theory and Unified Service Theory (UST). Systems theory offers an invaluable perspective on processes, hierarchies, and overarching systems in the context of medical tourism. Additionally, it illustrates the integration of service supply chain management performance measurements with the qualities of medical tourism services. Hence, applying systems theory not only aids the comprehension of the medical tourism supply chain framework but also allows scholars and practitioners to understand the bigger picture of the medical tourism supply chain perspective.

In parallel, the Unified Service Theory (UST) is instrumental in establishing the customer-supplier duality framework in the medical tourism supply chain. It emphasizes the interplay of bidirectional relationships among various stakeholders within this chain and identifies the constructs of service supply chain management linked to performance measurement development. The application of UST thus facilitates understanding and investigation of service performance measurements within the medical tourism supply chain, benefiting both scholars and practitioners.

These theories shape the conceptual framework of the medical tourism supply chain, providing insight into its structure and function. Within this theoretical context, the medical tourism supply chain in this study is devised from both supply and demand perspectives. It is constructed with the medical tourists at its core, who act as a link between the healthcare and tourism industries under the principle of customer-supplier duality. The proposed medical tourism supply chain comprises three tiers of suppliers that cater to medical tourists - the 2nd tier supplier, the 1st tier supplier, and intermediaries, organized based on their significance and roles in the industry.

In conclusion, to formulate the research question of this study, it is designed to address the identified literature gap in the context of Thailand's medical tourism industry. It sets a clear path for the research, sharpening the focus on understanding and elucidating the significance of service supply chain performance measurements in this dynamically evolving and globally significant industry.

Chapter 4

Research methodology

4.1 Introduction

This chapter aims to describe the research methodology adopted in this study. The research methodology is carefully selected to answer the research question and align with the research aims and objectives. The ‘research onion’ based on M. Saunders, Lewis, and Thornhill (2009) concept is proposed a metaphor for explaining the layers or steps of the research process. It consists of research philosophies, research approaches, research strategies, research choices, time horizons and data collection techniques and data analysis procedures, respectively. So, the research onion in Figure 13 is shown to present the adopted methods justification in this study. The detailed explanations will be provided in this chapter.

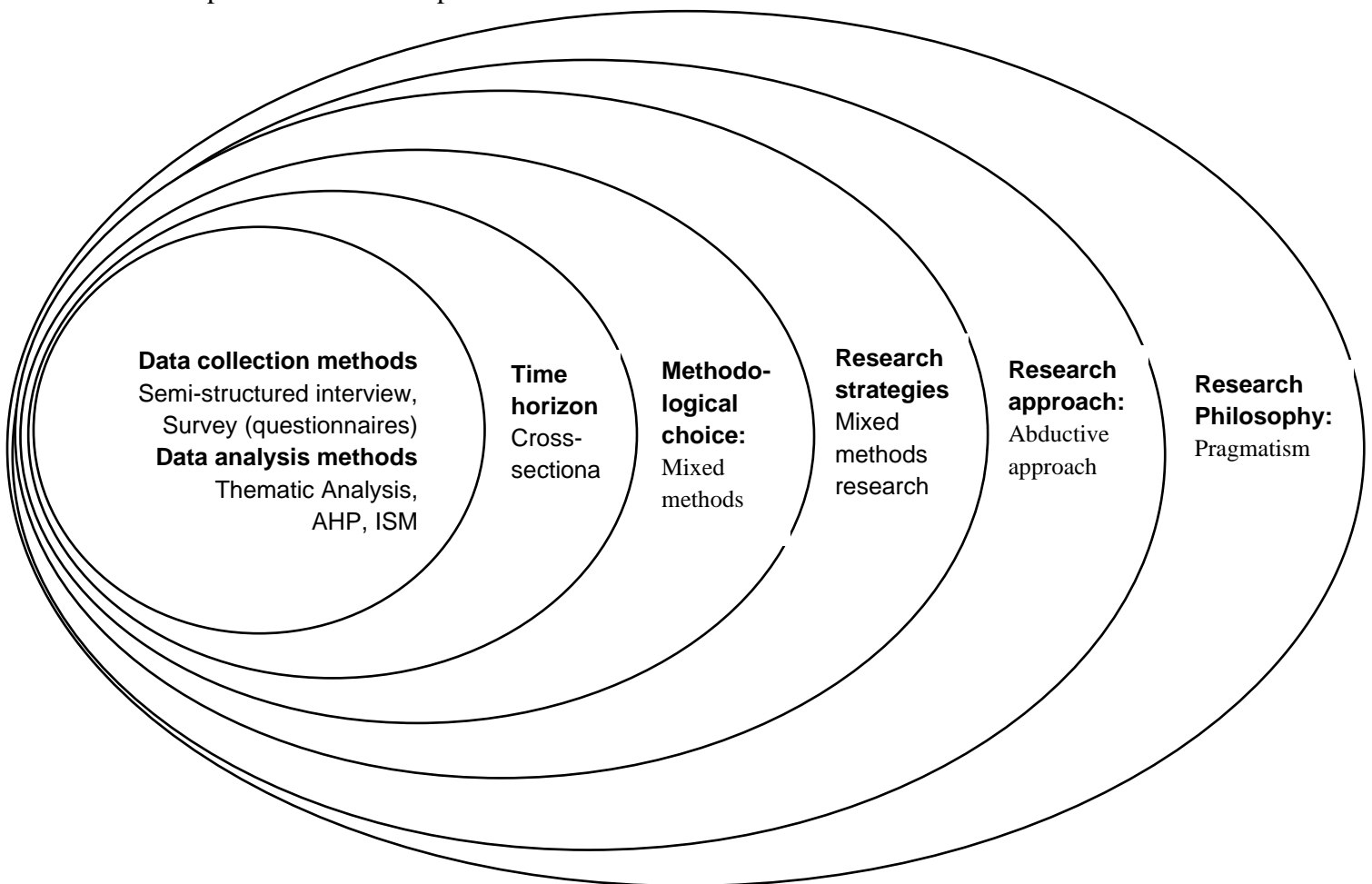


Figure 13 Summary of research onion adopted research methods

4.2 Research Philosophy

Research philosophy is crucial to the development of knowledge and research aims. Studying research philosophy is essential for selecting the research approach, research methods, and maintaining the direction of the study in alignment with its objectives. The selected research philosophy makes important assumptions about how researchers view the world (M. Saunders, Lewis, & Thornhill, 2019). There is no right or wrong choice of research philosophy, but it is advantageous for researchers to employ a research approach that enables them to answer their research questions effectively. Additionally, the practical use also reflects the research philosophy consideration (Collis & Hussey, 2013; M. Saunders et al., 2009). Saunders et al (2009) describe four philosophies for business research: positivism, realism, interpretivism, and pragmatism. Further details are presented in Table 19.

Positivism is the paradigm that highlights the natural sciences and scientific observation (M. N. K. Saunders, Lewis, P., & Thornhill, A. , 2000). Realism can be defined as a research philosophy that focuses on scientific inquiry and holds a reality independent of existing knowledge (M. Saunders et al., 2009). Interpretivism emphasizes on the study of social phenomena in their natural environment and pragmatism suggests that the most important determinants of its paradigm are the research question and objective (Saunders & Lewis, 2012).

To understand the differences between research paradigms, there are three philosophical positions that authors need to determine: ontology, epistemology, and methodological assumption (Saunders & Lewis, 2012; Lincoln et al., 2011). The underlying research philosophy guiding this study is the Pragmatism paradigm. The justification for adopting the pragmatism philosophy is to address the shortcomings of qualitative and quantitative approaches at different phases of this study (Dewey, 1916).

- Firstly, the research context of this study is the medical tourism industry. It involves a bidirectional chain of entities and a complicated supply chain for delivering services to patients. Pragmatism is more appropriate for this study than other philosophies as it offers the positivism structure based on a quantitative approach mixed with the flexible approach of qualitative research for data analysis (Lincoln et al., 2014).

- Secondly, in this study, the author aimed to use the same sampling group from phase one to phase three to maintain the consistency of judgments. Pragmatism allows several research approaches to penetrate the unpredictable findings and explanation for data analysis (Dewey, 1916).
- Thirdly, the aim of this research is to explore and prioritize the service supply chain performance measurements. The medical tourism industry has its own complex chain and data collection can be challenging. Therefore, pragmatism examines both the stances of positivism and interpretivism by investigating different situations where generalization is not appropriate (Leidner et al., 2009; Kirsch, 2004). It is recommended for this research.

Hence, the above discussion shows that the Pragmatism paradigm is applicable to this study. As the author initiates the research framework in chapter 3 based on the synthesis of the literature review, this approach is aligned with the Pragmatism view, which develops the medical tourism supply chain relationship and explores the service supply chain performance measurements. Additionally, by using this paradigm, this study aims to reveal the relationship between the service supply chain performance measurements and key success factors for the medical tourism supply chain. Furthermore, the service supply chain constructs of the medical tourism industry identified in the research framework originate from the system theory and unified service theory, which form the basis for data analysis.

Table 19 A comparison of research philosophies in management research

	Positivism	Post-Positivism	Realism	Interpretivism	Pragmatism
Ontology: the researcher's view of the nature of reality or being	External, objective, and independent of social actors	Critical realism- "real" reality but only imperfectly and probabilistically apprehensible	Is objective. Exists independently of human thoughts and beliefs or knowledge of their existence (realist), but is interpreted through social conditioning (critical realist)	Socially constructed, subjective, may change, multiple	External, multiple, view chosen to best enable answering of research question
Epistemology: the researcher's view regarding what constitutes Acceptable knowledge	Only acceptable phenomena can provide credible data, fact, focus on causality and law like generalizations, reducing phenomena to simplest element	Modified dualist/objectivist. Critical tradition/community, findings probably true	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Subjective meanings and social phenomena. Focus upon the details of situation, a reality behind these details, subjective meanings motivating actions	Either of both observable phenomena and subjective meanings can provide acceptable knowledge dependent upon the research question. Focus on practical applied research, integrating different perspectives to help interpret data.
Axiology: the researcher's view of the role of value in research	Research is undertaken in a value-free way, the researcher is dependent of the data and maintains an objective stance	Research is undertaken in a value-free way, but researchers accept the imperfection and believe that research results cannot be done by one study.	Research is value laden; the researcher is bias by world views, cultural experiences, and upbringing. These will impact on the research.	Research is value bound, the researcher is part of what is being researched, cannot be separated and so will be subjective	Values play a large role in interpreting results, the researcher adopting both objective and subjective point of view
Data collection techniques most often used	Highly structured, large samples, measurement, quantitative, but can use qualitative	Modified experimental/ Manipulative; critical multiples; Falsification of Hypotheses; may include qualitative methods	Methods chosen must fit the subject matter, quantitative or qualitative	Small samples, in-depth investigations, qualitative	Mixed or multiple method designs, quantitative and qualitative

Source: Saunders et al., 2009: p. 119, Lincoln et al. (2011)

4.3 Research Approach

The research approach is categorized into three different reasoning approaches: induction, deduction, and abduction (Saunders et al., 2009; Collis & Hussey, 2014; Robson, 2002). Generally, the induction approach focuses on generating theory from observation, whereas the deduction approach emphasizes theory testing (M. Saunders et al., 2019; M. N. K. Saunders, Lewis, P., & Thornhill, A. , 2000). Deduction involves the natural sciences and presents explanations and anticipated phenomena that can be measured. This approach requires the selection of a theory, the deduction of a hypothesis from the theory, the identification of the hypothesis to substantiate the outcomes with evidence, and the modification of the theory based on findings or outcomes if necessary (Collis & Hussey, 2009; Saunders et al., 2009).

Conversely, induction is concerned with understanding a research problem and generating a theory (Saunders et al., 2009). This research approach aligns with the pragmatism philosophy in terms of describing the root cause of research questions and explaining why certain phenomena occur. Additionally, Easterby-Smith et al. (2008, cited in Saunders et al., 2009) suggested that induction allows researchers to adapt the research design to the constraints of the practicum and design the overall configuration of research based on research questions and types of collected evidence sources.

The selection of the research approach depends on the nature of the topic and the focus of the research (Creswell, 2014). To gain the advantages and minimize the weaknesses of each approach, I aim to combine either two research approaches or adopt the 'abduction' approach within this study (Saunders et al., 2009; Saunders & Lewis, 2012; Robson, 2002). The abduction reasoning is proposed as an alternative approach in this study for the following reasons: To derive an explanation for the two research approaches, I employ the deduction approach in relation to the problem statement, research questions, data collection, and data validation in the quantitative part. The induction approach assists in investigating and explaining the cause-effect relationship among relevant factors, which is presented in the data analysis chapter.

Thus, the abduction approach seems to be the appropriate choice as this study aims to gain a better understanding of and fill the knowledge gaps in medical tourism supply chain management through the induction approach. Additionally, this study also operates from a deductive perspective in identifying the service performance constructs, key success factors of the medical tourism industry, and explaining the causal relationships among variables from a theoretical standpoint.

4.4 Research Strategy

There are several alternative research strategies to employ for the research methods such as experiment, survey, case study, action research, ground theory, ethnography, and archival research. author may allocate only one or more than one research strategies to undertake their research which is guided by theoretical underpinning, research paradigm, research aim(s), research question(s) and research objective(s) (M. Saunders et al., 2009, 2019). This section provides the research strategy adopted in this study and explains the detailed of research choices. Table 20 is presented the differences between quantitative research, qualitative research, and mixed methods. Table 21 is shown the detailed of brief description for each methodological choice of research strategy.

Table 20 Qualitative Mixed methods

	Quantitative	Qualitative	Mixed methods
Research Philosophy	Positivism	Interpretivism	Pragmatism
Research Approach	Deductive approach	Inductive Approach	Abductive approach
Research strategies	Associated with survey research and experimental research	Associated with case study, ground theory, ethnography, action research	Mixed research strategies

Both quantitative and qualitative research have been determined as effective strategies in this study, utilized through mixed data collection and data analysis techniques. A mixed method is widely adopted in business and management research for the following reasons (Saunders et al., 2009): Firstly, certain data collection methods may be used for each phenomenon. Secondly, mixed methods enable triangulation, which involves the use of multiple data sources and/or different research methods to examine the phenomena in a study. Thirdly, qualitative methods may be used to explain relationships between quantitative variables.

Table 21 A brief description of each methodological choice

Type of research strategy	Description
Experimental research	Experimental research is strongly used to examine the relationship among variables for both independent and dependent variables. Experimental is a form in the natural science. The optimum sample size should be 25 to 30.
Survey	Survey is a method which uses to collect primary or secondary sources from sample, with a view to analyzing the results to a population.
Case study	Case study is a methodology that is used to undertake a single case in a natural setting. It may apply by wide range of method to gain in-depth knowledge.
Action research	Action research is a methodology used in applied research to investigate an effective way of bringing about changes and results in a controlled environment.
Grounded theory	Grounded theory is a framework which integrates data from a systematic set of procedures to develop a derived theory about phenomena.
Ethnography	Ethnography is a methodology derived from the study of people, societies and customs in which researchers share knowledge and observe human activities.
Interview	Interview is a common methodology, which adopts questions protocol to conduct primary data from participants.
Archival research	Archival research is a methodology which uses the administrative records and historical documents. Records may exist but it might not include the precise information.

Source: Collis & Hussey, 2014; Saunders et al., 2009

Mixed methods refer to the way that research is undertaken. As an author, selects research methods based on the purpose of the research, which may be exploratory, descriptive, or explanatory. The selection of research methods aligns with abductive reasoning. However, it is essential that the

chosen research methods serve to answer the research questions and meet the required research objectives. Furthermore, mixed methods can reduce bias, leading to greater reliability and validity than a mono-method (Denzin, 1978, cited in Collis & Hussey, 2014). Mixed methods generally employ more than two types of data collection and data analysis within one research project (Tu, 2018). Recognizing that each individual research method has its pros and cons, mixed methods can bridge the gaps of each one and integrate the advantages of each method. In this study, author employed mixed methods to analyze collected data and explore SSC performance measurements. This study implemented a sequential approach in which qualitative and quantitative methods are used at different phases (Mangan, Lalwani, & Gardner, 2004). Qualitative data generally focus on words, experiences, and social phenomena in targeted communities (J. W. Creswell, 2014; John W. Creswell, Hanson, Clark Plano, & Morales, 2007).

In addition, the justification to support the mixed methods research is to fill the gap of weakness from qualitative and quantitative at different phases in this study (Dewey, 1916). The selection of the mixed methods research strategy in this study is based on these reasons as follow.

- Qualitative research methods can interpret potential participants' opinions and related experiences in the context of medical tourism. Due to Thai seniority culture, qualitative research is appropriate for participants' flexibility in terms of their availability and positions. Moreover, qualitative research enables me as an author to investigate potential experiences and trends that would be beneficial to this study.
- Quantitative research methods would benefit this study in terms of numerical variables, especially during the prioritizing process from potential participants. Assessing the importance of each service performance measurement would be easily understood and data collection would be facilitated by using surveys to obtain participants' judgments.

Consequently, author adopts mixed methods as the appropriate research choices for this study. There is a strong connection between qualitative and quantitative methods which leads to a mixed-method research strategy. This study employs survey and interview research strategies, which were suitable based on the purpose of the study, research paradigm, and research questions. The interview strategy is considered the primary tool in phase one and three. Meanwhile, the survey, paired with the quantitative part or phase two, can help author enable data analysis (M. N. K.

Saunders & Townsend, 2016). To verify the findings and results, this study aims to use various methods in parallel or sequentially for data collection and data analysis but does not combine either quantitative or qualitative studies. The cross-sectional strategy is determined due to the specific time and phenomenon during the data collection period before COVID-19 happened.

4.5 Overall Research Design

Given the countless research articles and publications available, it is impractical to review everything within a limited timeframe. Denyer (2006) and Tranfield (2003) suggested that a systematic literature review is relevant to delve into the extensive body of knowledge across a range of publications. Thus, the systematic literature review allows the author to refine the current state of existing literature, impacting the state of knowledge in this study (Tranfield, 2003).

The systematic literature review helps the author outline the research plan and specify the direction of the existing literature search, the application of related methods, the extent of research problem statements, and the process of finding relevant studies (Denyer, 2006). This systematic literature review started by defining the key journals covering the time span of 20 years (2000-2020), which included numerous respected international journals. Updates from 2021-2022 may be incorporated later where applicable.

Therefore, the author selected relevant keywords aligned with the research aim and objectives of this study (Denyer, 2009). These keywords were primarily: 'medical tourism', 'medical tourism index', 'medical tourism in Thailand', 'medical tourism performance measurements', 'Service supply chain management', 'performance measurement in service industry', 'supply chain in service industry'. Additional keywords may vary to further penetrate the literature review.

The systematic literature review provides rough themes to form the theoretical framework in this study and highlighted limited studies on Thai medical tourism performance evaluation and performance measurements and service supply chain management (see details in Chapter 2). Given the extensive publications on medical tourism, the author excluded irrelevant studies related to overly broad aspects of other countries, irrelevant research methods used for large sample sizes, and manufacturing supply chain management contexts. Thus, the systematic literature review allowed

the author to confine the study frame and scope to medical tourism and service supply chain management.

Based on the pragmatism research philosophy, different research methods may include many tools used for data collection and data analysis to investigate the research question (Charmaz, 2014). This study's overall research design consists of three empirical phases aimed to fulfill the research aim and objectives (see Figure 14). Phase one is based on an extant literature review that identifies medical tourism service performance measurements and analyzes them using thematic analysis. The initial proposed model is validated in this empirical phase. The remaining empirical phases are divided into phase two and phase three. Phase two aims to explore and prioritize the importance of each service supply chain management performance measurement on medical tourism supply chains by collecting data from practitioners in JCI accredited healthcare service providers using AHP. Phase three aims to identify the relationship among the top ten refined SSC performance measurements leading to medical tourism key success factors through semi-structured interviews. Subsequently, the ISM hierarchy model of medical tourism SSC performance measurement is built.

In phase one, an interview protocol was created, and a pilot study was conducted. Semi-structured interviews were used as the main tools to confirm and validate the proposed measurements in the study. These interviews were conducted with experienced JCI practitioners in Thai medical tourism industry from a variety of highlighted places. Thematic analysis was then chosen to validate the main themes. Thus, the medical tourism service supply chain framework was built, and potential proposed SSC performance measurements were generated in this study.

In phase two, surveys as questionnaires for the AHP approach were allocated to experts to collect data from research practitioners. The aim of this phase was to assess the importance of each SSC performance measurement from each major SSC activity which can lead to service improvement. This phase primarily prioritizes the proposed SSC performance measurements in the medical tourism supply chain established in study phase one to obtain the relative weights of influential factors based on seven SSC main themes.

In phase three, semi-structured interviews were used to collect data from the same group of participants to present the top ten empirical research results from phase two. The interrelationships

among SSC performance measurements were evaluated. Results from the ISM method facilitated the explicit interrelationship among SSC performance measurements which may assist and guide practitioners about the direction of focus and potential strategies to improve healthcare service provider's performance in the future. In the conclusion chapter, research results were compared with literature and results from each phase were concluded.

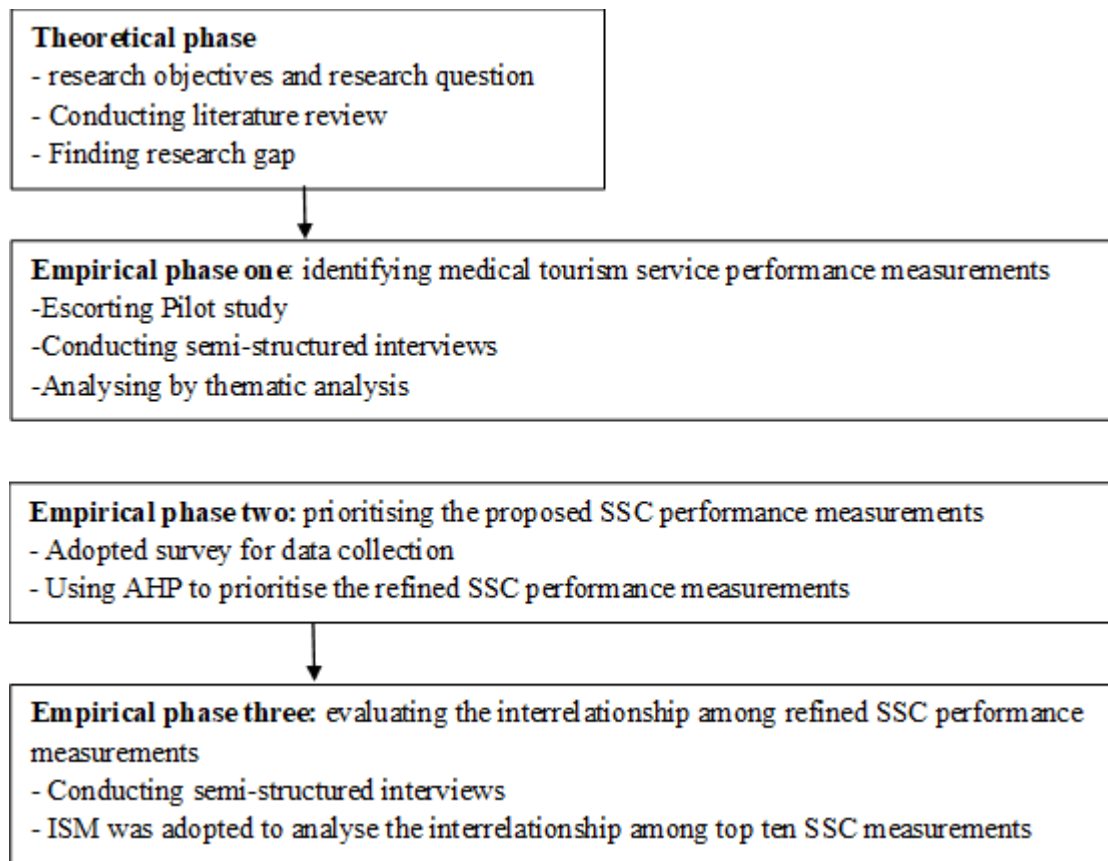


Figure 14 Overall research design

4.6 Pilot study

To classify and prepare data to establish SSC performance measurements, the existing and relative medical tourism industry and SSC measurements were conducted before empirical data collection. Data were collected using in-depth interviews method in January 2020. For this study, in-depth interview was selected as the appropriate tool for data collection within exploratory study to elicit medical tourism gaps and insights to performance scale developments. After an interview guide was developed, author identified potential respondents, pilot interviews were undertaken before empirical data collection. Additional documents such as hospital and tour packages brochures, functional documents, some hospital historical statistics data (confidential data but seen on sites only) were collected to accomplish triangulation.

The target population in pilot study was drawn from the professionals in hospital accredited JCI standard in Thailand (Joint Commission International, 2022) and academics from universities and higher education institutes in Thailand. Among the study cohort, 5 participants met our eligibility inclusion criteria for exploratory study e.g., their background and at least 5 years working experience. The participants for this exploratory study were taken from Bangkok, Phuket, Chiang-Mai and Nakhon Ratchasima provinces. Eligible participants were between the ages of 40 and 60. Table 22 below shows the characteristics of respondents in pilot study.

The purposes of these interview were to discuss about the current state of medical tourism industry, medical tourist behaviour, potential performance measurements and medical tourism supply chain management. All five interviews for exploratory study were conducted after discussing about the research description and research objectives to the interviewees. Each interview lasted for 60 – 90 minutes being encouraged to provide their opinions and insights. During the interviews, the interviewees were mainly asked about their general information such as their roles and responsibilities in positions and the current state of Thai medical tourism both from their company's views and external situation. All proposed SSC measurements based on the extensive literature review were asked and provided the comments on each factor from the proposed questionnaire which using in Phase two.

Table 22 Characteristics of respondents (Pilot study)

Company	Interviewee's position	Role and responsibility in interviewee's position	Year of experience
Hospital A (Bangkok)	Vice hospital director	<ul style="list-style-type: none"> Fully involve in aspects about overall financial and fiscal management and healthcare quality management Manage the overall demand and marketing plans 	7
Hospital B (Phuket)	Head of department	<ul style="list-style-type: none"> Fully involve in aspects about strategic marketing and international patients. 	14
Hospital C (Chiang Mai)	Head of service support department	<ul style="list-style-type: none"> Involve in aspects about international medical services 	5
University A (Nakhon-Ratchasima)	Senior Lecturer	<ul style="list-style-type: none"> Specialising in service operations and supply chain management 	10
University B (Bangkok)	Lecturer	<ul style="list-style-type: none"> Specialising in marketing and tourism 	6

4.6.1 Preliminary findings from pilot study

Interviews with five personnel took place including three top-level positions from Bangkok, Phuket, and Chiang Mai and two senior academics from Bangkok and Nakhon Ratchasima (See Table 22).

The recommendations from five interviews show that the average time spent for self-completion questionnaire would complete around 25-30 minutes. As from the provided interview guide, all experts suggested that it would take some time around 45-60 minutes per time for empirical data collection by semi-structured interview approach. All experts as the respondents were asked to comment in detail on each construct. All experts also provided some concerns for empirical data collection such as the healthcare service provider confidentiality, the successful sampling should have full ranges of information in average or coverage all geographical area of study (e.g. Chiang

Mai, Phuket, Khon Kaen or tourist attraction province) in the population and the limited time to collect the data during the COVID-19 pandemic since New Year 2020. In term of questionnaire development, they were all agree in the draft of questionnaire and the comments are also provided to change and add-on in some points such as language translation, spelling, layout, clear instruction, and definition on each construct. As from the comments, these changes in main contexts were minor, then the draft of questionnaire development was proceeded. Hence, the questionnaires were ready for distributing to respondents for empirical data collection.

4.7 Methods for data collection

This study employed mixed methods strategies between qualitative and quantitative which both were applied at different phases (Zubairu et al., 2021). The Mixed methods for data collection were adopted to balance the strengths and limitation of each method, and it is also meaningful for facilitating interpretation from a single dataset (Braun & Clarke, 2006).

The data collection methods included semi-structured interview and survey. Phase one adopted semi-structured interview to deductively identify medical tourism service performance measurements. Phase two utilised surveys with research participants to prioritise the medical tourism service supply chain performance measurements identified from phase one. Phase three deployed semi-structure interview to validate the interrelationship among medical tourism service performance measurements based on pareto 80/20 (Pareto, 1964).

4.7.1 Semi-structured Interview

There are three main interview forms such as structured, semi-structured and unstructured interviews (Saunders et al., 2009). Author adopted semi-structured interview based on the purpose of study as explanatory research and it also allows researchers omit and add the interview questions depends on different circumstances and nature of research (Saunders et al., 2009; Collis & Hussey, 2009). In addition, semi-structured interview enables an opportunity to get the relevant information relating the research topic (Saunders & Lewis, 2012). Due to the sensitivity of Thai seniority culture, semi-structured interview is appropriate to collect data from top level positions or manager levels. Consequently, author gathered primary data and met all research participants around tourism areas of Thailand. The Table 23 below is presented about advantages and disadvantages semi-structured interviews.

Table 23 Comparison advantages and disadvantages semi-structured interviews

Advantages	Sources	Disadvantages	Sources
<ul style="list-style-type: none">• Gain more details, explanation• Flexible & sensitive• Complex question can be discussed• Positive rapport with interviewees• High validity• Respondents can provide details as much as they can	Saunders et a., 2009; Collis & Hussey, 2009; Saunders & Lewis, 2016	<ul style="list-style-type: none">• Small sample size• Time consuming• Interpersonal skills are required• Depth information may hard to analyse	Saunders et a., 2009; Collis & Hussey, 2009; Saunders & Lewis, 2016

Source: Author

Therefore, semi-structured interview has the mentioned limitations, it is still a preferred method for data collection because author aims to collect data through semi-structured interview to study in qualitative part. It would help author gain better understanding of a wider range of factors. Furthermore, semi-structured interviews are flexible for respondents to explain their views and opinions as much as they can, whereas the researchers also adjust the questions and change the direction of conversation to gain more explanations (Creswell, 2018).

4.7.2 Survey

Saunders & Lewis (2012) proposed that survey is a research strategy which provides the structured collection of data from sample, with a view to analyzing the results to a population. The survey strategy is popular and widely used in business and management research because people find it uncomplicated to understand, save time, and get many people results from same questions. In addition, there are various methods for data collection such as self-completion questionnaire, postal and internet questionnaires, telephone, and face-to-face interviews (Saunders et al., 2009; Collis & Hussey, 2009, Easterby-Smith et al., 2012). Generally, surveys are associated with a positivism study and some might also use under interpretivism paradigm (Collis & Hussey, 2009).

In this study, author justifies that survey is an appropriate as predominant tool for data collection. The collected data would be used for both quantitative and qualitative parts to identify the different findings. Additionally, the purpose of this study is analytical research, survey can help

author to conduct and determine a relationship among multiple service performance measurements based on the theoretical framework which is shown in chapter 3. Based on the purpose of research as the explanatory research, this study aims to undertake the attitudes and opinions of medical tourism industry practice and to examine the relationship among the proposed constructs and cause-and-effect relationship. Therefore, this study adopted a survey-based approach from the questionnaires and planned to administer the rating questions type as semantic differential rating scale questionnaire to determine the importance and ranking SSC performance measurements on medical tourism industry. The advantages and disadvantages of a questionnaire-based survey is explained in Table 24 below.

Table 24 Advantages and Disadvantages of questionnaire

Advantages	Sources	Disadvantages	Sources
<ul style="list-style-type: none"> • Enhance respondent's participation • Flexible • suitable for small number of respondents • get depth information from respondents such as opinion, attitude, and behavior 	Saunders et a., 2009; Collis & Hussey, 2009; Saunders & Lewis, 2016	<ul style="list-style-type: none"> • Limited size of sample • Low confidence that right person has responded but can be confirmed at collection 	Saunders et a., 2009; Collis & Hussey, 2009; Saunders & Lewis, 2016

Source: Author

So basically, the rating questions use the Likert-style rating scale in which respondents are asked to express their opinions (Collis & Hussey, 2009). Semantic differential rating scale questionnaire is kind of rating question which often used to collect opinion and attitude data (Saunders et al., 2009). Semantic differential rating scales consists of a single object or idea on a series of bipolar rating scales. Each bipolar scale is explained by a pair of opposite objectives for example positive or negative, disagree or agree, value for money or over-priced, fast, or slow and so on (see Figure 15).

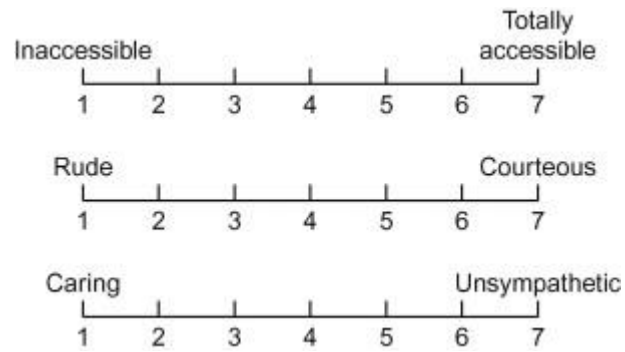


Figure 15 Example of Semantic differential rating scale

Semantic differential rating scale questionnaire adopted in this study based on the research aims of scales prioritization and suitable for data analysis methods. In this study, it is important for designing the questionnaires to collect pair-wise comparison judgement to having consistent result from AHP method. Thus, this employed the semantic differential rating scale questionnaires because all respondents needed to assign relative score for each construct to pair-wise comparison for data analysis of AHP method.

4.8 Methods for data analysis

It is noted that the studying of service supply chain management is a complex approach and needs holistic approach for its implementation. To improve the supply chain management performance in medical tourism industry, an understanding of the importance of each service supply chain management performance measures were required (Cho et al., 2012). Hence, this study used mixed methods to analyze the collected data. This study was divided into three phases and each phase used the different approaches such as thematic analysis was used in phase one; Analytic Hierarchy Process (AHP) and Interpretive Structural Modelling (ISM) were employed in phase two and three, respectively.

4.9 Thematic Analysis

Thematic analysis is a qualitative approach to extract the meanings from collected data and patterns as themes (Javadi & Zarea, 2016). Long conversation, complex sentences and hidden meanings is transformed into the refined themes. Creswell (2009) suggested that thematic analysis process starts with collecting the raw data from original sources, then organizes gathered data for coding and describing. In this study, the qualitative data collected through semi-structured interview with

healthcare service providers in Thai medical tourism. After conceptualization, the codes of raw data, author categorized and specified theme to be linked together. Finally, interpretation process is determined to develop the explanatory account which propose rational meaning to describe themes.

4.9.1 Fundamental of Thematic Analysis

Thematic analysis was used to analysis the collected data through semi-structure interview for study phase one. Thematic analysis is an approach of identifying, categorizing, and reporting themes and patterns within qualitative data (Braun & Clarke, 2006, 2012). Thematic analysis is different from other qualitative analysis methods such as content analysis, discourse analysis, and narrative analysis by providing detail of qualitative data to identify the common patterns across entire data set of interview (Clarke & Braun, 2014). Braun and Clarke (2006) differentiate two levels of themes for thematic analysis between semantic and latent. Semantic theme is the explicit meaning of the data which analyses particularly within the context that gathered from research participants. Meanwhile, latent theme is the interpretive analysis by identifying ideas and assumption and investigating the semantic content of data (Braun & Clarke, 2006).

4.9.2 Procedure for Thematic analysis

Braun and Clarke (2006) provided the outline of thematic analysis process, which consists of six steps, which consist of familiarization with data, generating the initial code, searching for themes, reviewing themes, defining, and naming themes, and producing report. Figure 16. Presents the step-by-step of thematic analysis (Braun & Clarke, 2006).

1. Familiarization with raw data

To commence the qualitative analysis, all collected data audio files were transcribed and immersed by author. All verbatim data needed to be transcribed into written forms. Greater familiarization with data can help author to achieve high quality analysis and simply to visualise in computer-assisted qualitative data analysis software.



Figure 16 Thematic Analysis Process

2. *Generating the initial codes*

This step implied the production of initial codes after author familiarised collect data which transcribed from verbatim to written form. At this stage, coding process identified the level of themes between semantic and latent themes and noted interesting items relating to research aim for evidence that supports prior themes.

3. *Searching for themes*

After identifying the lists of codes across all data set, this step focuses on searching broader level of themes. At this stage, there would be a set of initial codes that exclude from the main theme. Author then allocated this set of initial code to miscellaneous themes because

it may fit into other main themes later. This phase would be ended with the refined main themes, sub-themes, and all extracts data in related potential themes.

4. Reviewing themes

Braun and Clarke (2006) suggest two main steps should be conducted which are reviewing and refining themes. All extracted data were allocated to form the patterns. After getting the main themes and sub-themes, author determined the links between each main themes and sub themes for themes refinement.

5. Defining and naming theme

Author conducted and analysed individual themes carefully and see the coherence of main themes and sub themes. By the end of this step, author clearly named what themes were and what themes were not. In this study, author chose to name along the previous research (Boon-itt & Pongpanarat, 2011; Boon-Itt et al., 2017; Cho et al., 2012) to see the difference between other service industry contexts and medical tourism context.

6. Producing report

This step simply showed the refined themes from this study. Then, author also provided the evidence of themes within the dataset. By the end of this, report was explained in the next chapter.

4.9.3 Thematic analysis presentation

The endpoint is about presenting the content and meaning of themes from gathered data (Braun & Clarke, 2006). Thematic analysis results are discussed in study phase one based on the collected data across Thai healthcare service providers. To illustrate the clear qualitative data analysis results, author aims to choose the software to generate the concrete, concise, and coherence presentation.

Using MAXQDA-2020 as a data analysis tool, it helps about data management and facilitate the transparency of qualitative research process same as NVivo (Kuckartz & Rädiker, 2019). The use of software MAXQDA-2020 facilitated the coding process as required from thematic steps. Coding process refers to allocate text or relevant data to suitable node. Author selected MAXQDA to employ this stage because MAXQDA has its own advantage to recheck and track back and forth between analysis and data with the explicit visualization (GmbH, 1995-2021).

In this study, deductive coding was the first step by starting with specific themes based on the SSC exiting literature review including 7 main themes, keywords from expert and then explore whether these are related or mentioned in data sources by using axial code function of MAXQDA. Once completing the coding process, the actual analysis initiated. Author reviewed the main themes, sub-themes and refined all relative codes into the suitable themes. During the ongoing analysis, Author always rechecked and determined a thematic map to ensure that the entire set of data within each theme were classified into the correct main themes. In addition, author also worked parallelly with the experts until the thematic analysis finished. Finally, an analysis report generated (see details in Chapter 5).

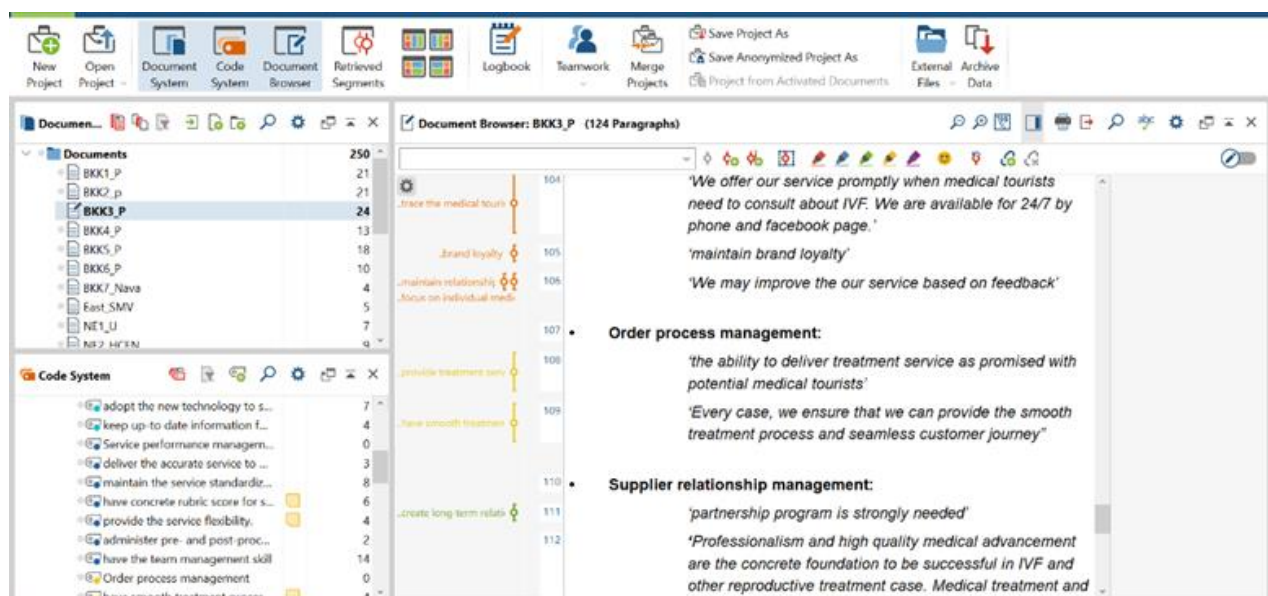


Figure 17 The example interface of MAXQDA-2020

4.9.4 Rationale for adopting thematic analysis

The decision to utilize thematic analysis in this study is supported by several justifications. First, thematic analysis is a highly flexible qualitative data analysis method, allowing for the identification of key themes across collected data (Braun & Clarke, 2006). This flexibility is particularly valuable in capturing and organizing the rich and diverse perspectives of the informants. Table 25 below presents the comparison of different qualitative research methods. Second, the results of thematic analysis are typically presented in a straightforward and easily understandable manner, making them suitable for conveying findings to busy top-level executives (Braun & Clarke, 2006). This aspect is important for ensuring that the study results can be effectively communicated and utilized by stakeholders with limited time availability.

Another advantage of thematic analysis is its ability to support a dynamic and iterative analysis process, facilitating the cross-checking of verbatim transcriptions and enabling a back-and-forth movement between data and emerging themes (Braun & Clarke, 2006). This iterative nature of thematic analysis allows for a thorough exploration of the collected data and helps in identifying unexpected insights and potential areas for further study (Demuth & Terkildsen, 2015).

It is important, however, to acknowledge the potential limitations of thematic analysis. The flexibility of this approach can sometimes lead to inconsistencies or mismatches between the collected data and the identified themes (Braun & Clarke, 2006; Zhao et al., 2020). Additionally, thematic analysis may have limitations in terms of providing a specific direction or focus for the analysis (Dapkus, 1985; Braun & Clarke, 2013). Furthermore, while thematic analysis can assist in organizing and interpreting data, it may have limited interpretive power to support broader research notions and outcomes.

Despite these limitations, the advantages of thematic analysis align well with the objectives of this study. Its flexibility allows for a comprehensive exploration of the qualitative data collected through semi-structured interviews, enabling the identification of key themes and unexpected insights.

Therefore, thematic analysis was chosen as the method to analyze and evaluate the qualitative data in this study.

Table 25 The example interface of MAXQDA-2020

Qualitative data analysis methods	Description	Advantages	Disadvantages
Narrative analysis	Narrative analysis is an analysis of people's stories to derive the meaning of their lives and series of their stories (Earthy & Cronin, 2008).	<ul style="list-style-type: none"> ▪ Flexible method ▪ Easy to analyse people's stories to derive meaning ▪ Findings may facilitate the alternative results and potential futures. 	<ul style="list-style-type: none"> ▪ Subjective interpretation ▪ Small sample size ▪ Narrow scope to analyse and may neglect broader context
Content analysis	Content analysis is an approach of systematic coding used for interpreting large text data set (Krippendorff, 1989).	<ul style="list-style-type: none"> ▪ Evaluate the patterns within one or more process of contents ▪ Can be used for qualitative and quantitative ▪ Present human thoughts, insights, and language use 	<ul style="list-style-type: none"> ▪ Time consuming ▪ Simply shows word counts ▪ Too broad meaningful conclusion ▪ Tends too often to computerise
Discourse analysis	Discourse analysis is an analysis of the understand of language based on the sociocultural context (Blommaert & Bulcaen, 2000; Sheyholislami, 2001).	<ul style="list-style-type: none"> ▪ Reflects how people speak about contexts and cultures ▪ Enable to provide comprehensive view of problems ▪ Disclose the hidden insights behind people's thoughts or opinions. 	<ul style="list-style-type: none"> ▪ No specific answers to the questions ▪ Often facilitate the intangible answers to problems ▪ Subjective interpretation
Thematic analysis	Thematic analysis is a analysis research approach to identify the similarities and differences, highlight and extracted data by examining themes and patterns (Braun & Clarke, 2006, 2012).	<ul style="list-style-type: none"> ▪ simply to identify key themes and patterns from data ▪ useful for summarising the key highlight of a large body of gathered data ▪ high flexibility ▪ it is not necessary to have high education to understand the results ▪ Enable researchers examine the participants' highlights and meet unexpected similarities and differences 	<ul style="list-style-type: none"> ▪ Too broad to narrow down ▪ Sometimes a part of data collection may lead to various results direction ▪ Unprofessional analysis may decrease interpretive power ▪ Broad views cause extra time to go back and forth about iteration and revision

Source: (Braun & Clarke, 2006; Francis et al., 2010; M. Saunders et al., 2019)

4.10 Phase II: The Analytic Hierarchy Process (AHP)

Analytic Hierarchy Process (AHP) is a Multi-criteria decision-making (MCDM) approach in analyzing, making decisions, and solving multiple criteria and complex problems. AHP is an efficient and effective method to transform a complicated situation into elemental issue to develop a hierarchical model (Saaty, 1980; Dyer, 1990; Saaty, 1986; Dyer, 1990). In this study, the main objective is mainly about prioritizing the proposed service supply chain performance measurements in Thai medical tourism context. Author found that the first stage should be considered to appropriately use AHP to rank the service supply chain management performance measurements which were extracted based on the extant literature review and the results of study phase one (Sharma 2007 and Bhagwat 2009). The prioritization results of this study will help the supply chain managers knows that which factors influencing their success and they can highlight and focus more on those factors.

4.10.1 Fundamental of Analytic Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) was firstly developed by Saaty in 1972 as a practical approach in analyzing, making decisions, and solving multiple criteria and complex problems. AHP is an efficient and effective method to transform a complicated situation into elemental issue to develop a hierarchical model (Saaty, 1980; Dyer, 1990; Saaty, 1986; Dyer, 1990). It can also help researchers identify factors and consider different preference and importance by assigning weights on each factor (Song et al., 2017). Due to mathematical flexibility, AHP method was implemented in various fields such as transport (Duleba, 2019), engineering, business, supply chain, healthcare (Singh, 2013; Yu & Hu, 2013).

4.10.2 Procedure for Analytic Hierarchy Process

Generally, a typical hierarchy model consists of overall goal or the best alternative which is allocated as the highest level; sub-factor or elements in the same interim level and decision variables or choices are allocated as the lowest level of hierarchical model (Tung & Tang, 1998). So basically, the use of AHP is described for four main principles below (Saaty, 1980; Song, 2017; Wang, 2019).

1) Decompose decision problem into a hierarchy

The first step in AHP is to formulate an appropriate hierarchy model by breaking down the decision problem into sub-factors and decision variables. Then, it needs to structure these factors in sequence from top to bottom level. Therefore, this step requires to formulate a hierarchical model which consists of the goals, 7 service supply chain management measurements and 44 sub-SSC constructs. The goal of this study is to prioritise SSC measurements for improving medical tourism supply chain, so that service supply chain becomes essential for all components of the chain.

The first step is to allocate on the first level of the hierarchy. The interim level or the second level includes seven service supply chain management constructs, namely demand management, capacity and resource management, customer relationship management, order process management, supplier relationship management, service performance management and information and technology management are identified to achieve the goal and allocated in the second level of hierarchy. The bottom level or the third level of hierarchy consists of 44 sub-constructs of seven service supply chain management constructs. There are 5 sub-constructs related to demand management process, 6 sub-constructs related to capacity and resource management process, 7 sub-constructs related to customer relationship management, 6 sub-constructs related to order process management, 5 sub-constructs related to supplier relationship management, 6 sub-constructs related to service performance management, and 8 sub-constructs related to information and technology management.

The second and the third levels can be measured using the basic AHP approach of pairwise comparison of elements in each level with every parent element located one level above. A set of priority weight can be considered for each sub-construct by multiplying local weight of sub-construct with weight of all the parent nodes above it (Singh, 2013).

2) Construct pairwise comparisons and assign priorities among the elements in hierarchy

The second step in AHP after formulating hierarchical model, a series of pairwise comparison developed to produce the weights of each factor comparing to other factors in the same level. Author assigned the numerical value for comparison and expressing the strength of one factor over other factors as it is illustrated in Table 26 below.

Table 26 Thomas Saaty's nine-point scale

Intensity of Importance	Definition	Explanation
1	Equal importance	Two factors contribute equally to the objective
3	Weak importance	Experience and judgement slightly favor one factor over other
5	Strong importance	Experience and judgement strongly favor one factor over other
7	Very strong importance	Experience and judgement very strongly favor one over other
9	Extreme importance	The evidence favoring one over other is of the highest possible order of affirmation
2,4,6,8	Intermediate values between two adjacent judgement	Used for representing compromises between the preferences in weights 1,3,5,7, and 9
Reciprocals of above nonzero	opposite	Use for inverse comparison

3) Compute weights of each variable

The priorities obtained from the comparisons are applied to weight the priorities in each level for every factor. Then, it needs to determine the eigenvectors for normalizing the results matrix. This process continued until all levels of hierarchical model and a series of judgement are gained weights.

4) Evaluate the consistency of judgement

Before validating, one essential tasks of AHP are to calculate the consistency level of estimated vectors (Singh, 2013). Consistency ratio (CR) is known to measure the consistency in pair-wise comparison. Saaty (1994 cited in Singh, 2013) has established the acceptable CR value for vary matrices sizes such as a 3-by-3 matrix should have CR value no more than 0.05, a 4-by-4 matrix should have CR value no more than 0.08 and 0.1 for large matrices. The weight results are valid if consistency ratio level falls into the Acceptable range. The aim of computing consistency ratio and checking its value is to ensure that the original rating was consistent. Therefore, the steps to get consistency ratio (CR) are described as following.

- Calculate the consistency measure
- Calculate the consistency index (CI) = $(\lambda_{\max} - n) / (n - 1)$
- Calculate the consistency ratio (CR) = CI/RI corresponding to N

RI: Random consistency index

N: number of elements (see Table 27)

Table 27 Random consistency index value (RI)

N	1	2	3	4	5	6	7	8	9
RI	0	0	0.525	0.882	1.115	1.252	1.341	1.404	1.452

When CR value is less than 0.1, judgements are determined to be consistent. If CR value is greater than 0.1, it needs to be revised because it is determined as inconsistent.

4.10.3 Analytic Hierarchy Process (AHP) presentation

In this study, the Analytic Hierarchy Process (AHP) model was employed to evaluate the Service Supply Chain (SSC) performance measures within each thematic area, as suggested by Roh, Pettit, Harris, and Beresford (2015). According to Thomas L. Saaty (2004), importance weights of each criterion are calculated to reflect their decision-making priorities. The AHP, as outlined by T. L. Saaty (1970), begins with the decomposition of the hierarchical model to clearly define the structure of the model. Once the hierarchy is decomposed, each criterion, or SSC performance measurement, is evaluated based on comparative judgments. Subsequently, the synthesis of the priorities is presented (see in Figure 18) (Liberatore & Nydick, 2008).

Define the Objective:

Based on extensive literature review, it was found that the Thai medical tourism sector still faces the challenge of lacking concrete SSC performance measures (Ahani et al., 2021; Baashar et al., 2020). This is mainly due to the application of traditional supply chain measures for performance assessment. This study sought to understand the medical tourism supply chain model and propose potential service performance measurements to evaluate its performance and customer satisfaction.

Therefore, this clear objective was placed at the top level of the AHP hierarchy (Ho, 2008; Taneja & Sushil, 2007; Vargas & IPMA-B, 2010).

Establish the Criteria:

Based on the identified research gap, the next step was to establish the criteria, which were the proposed SSC performance measures. Each of these performance measures became a criterion within the hierarchy, enabling the evaluation and comparison of their importance in achieving the objective.

Pairwise Comparison of Criteria:

With the criteria established, research participants from the Thai medical tourism industry performed pairwise comparisons of the criteria, which were the SSC performance measures in this case. The participants assessed individual evaluations using Semantic differential rating scales provided in the questionnaires. This helped to assign importance weights to each of the SSC performance measurements.

Synthesize the Priorities:

After completing the pairwise comparisons, the next step was to synthesize the priorities. The importance weights calculated in the previous step were used to rank the SSC performance measurements in order of their priority. This ranking indicated which performance measures were most important in improving performance and customer satisfaction in the Thai medical tourism sector.

In essence, the decomposition of the AHP hierarchy in this study helped to break down the complex problem of evaluating SSC performance measures into manageable parts, thereby facilitating a structured and systematic evaluation and decision-making process.

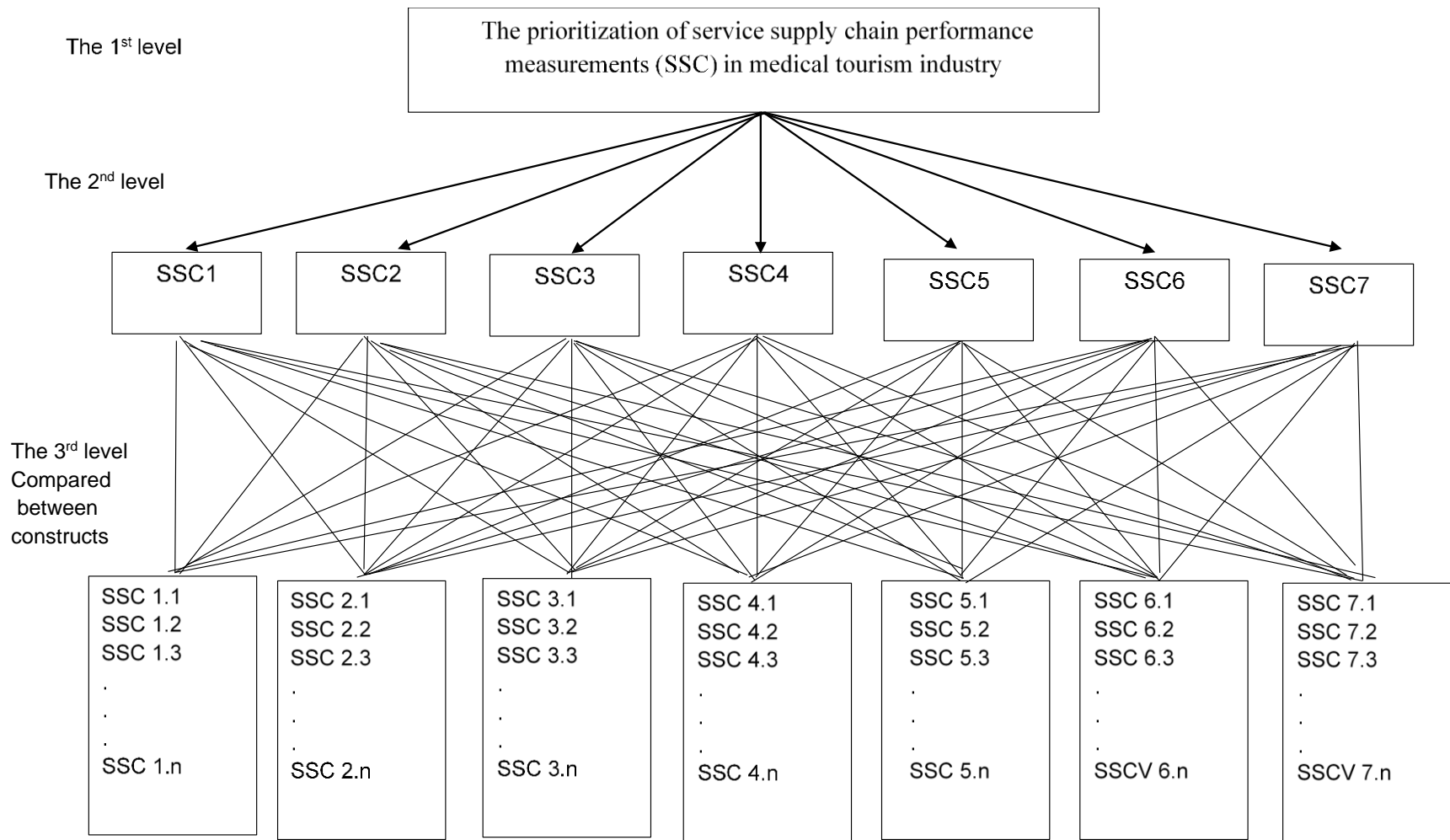


Figure 18 Hierarchical model for AHP (see detail in Chapter 6, Final weight section)

4.10.4 Rationale for adopting AHP

The adoption of the Analytic Hierarchy Process (AHP) in phase two of this study is justified for several reasons. First, compared to other multi-criteria decision analysis (MCDA) methods like VlseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), and Analytical Network Process (ANP), AHP is easier to apply and better suited to this study (Huang, Tzen (Huang, Tzeng, & Ong, 2005; Magableh & Mistarihi, 2022; Opricovic & Tzeng, 2007; Thomas L. Saaty, 2004). A comparison of different MCDA advantages and drawbacks is outlined in Table 28.

Second, the goal of this phase is to determine the ranking of the influence of refined SSC performance measurements. In this respect, AHP is preferable to VIKOR, as VIKOR lacks a consistent judgment process and has a lower level of universality (Babashamsi, Golzadfar, Yusoff, Ceylan, & Nor, 2016; Jahan, Mustapha, Ismail, Sapuan, & Bahraminasab, 2011).

Third, ANP, another MCDA approach and a developed form of AHP, was also considered (Huang et al., 2005; Magableh & Mistarihi, 2022; Thomas L. Saaty, 2004). However, ANP was not chosen due to its emphasis on network relationships, which can result in complex outcomes (Magableh & Mistarihi, 2022).

Fourth, AHP was selected over the TOPSIS method due to its relevance to the research and its applicability to prioritization tasks. In contrast, TOPSIS focuses on the proximity to ideal solutions and problem-solving (Magableh & Mistarihi, 2022; Raj, 2015).

Finally, despite the limitations of AHP, it was deemed the best fit for this study due to its ability to analyze complex hierarchies with multiple research participants across Thailand. All research participants held top-level positions or managerial roles, making it feasible to collect data from many samples. Thus, AHP was an optimal choice for prioritizing potential performance measurements in this context.

Table 28 Comparison of different multi-criteria decision-making methods

Quantitative data analysis methods	Description	Advantages	Disadvantages
VIKOR	VIKOR is an MCDM method to rank the set of alternatives and propose the compromised solution (Jahan, Mustapha, Ismail, Sapuan, & Bahraminasab, 2011; Opricovic & Tzeng, 2007)	<ul style="list-style-type: none"> ▪ Flexible method ▪ Provide the results both positive and negative alternatives to solve the problems ▪ Suitable for small index value 	<ul style="list-style-type: none"> ▪ Lack of provision to consistency judgement ▪ Low level of universality ▪ Complex calculation
TOPSIS	TOPSIS is one of MCDM method focusing on the distances or proximities to the ideal solution with both positive and negative values (Hwang, Yoon, Hwang, & Yoon, 1981; Raj, 2015)	<ul style="list-style-type: none"> ▪ Evaluate the patterns within one or more process of contents ▪ Focus on the distance ▪ Provide comprehensive logic in mathematic forms 	<ul style="list-style-type: none"> ▪ High uncertainty about weight measuring ▪ Lack of consistency judgement ▪ High subjectivity ▪ The arranged order preferences would be reversal
ANP	ANP is an MCDM approach to assess and consider the relationship of structure. ANP is another developed form of AHP (Huang, Tzeng, & Ong, 2005; Thomas L. Saaty, 2004)	<ul style="list-style-type: none"> ▪ A general form of AHP but focusing on network ▪ ANP has subnetwork and sub model ▪ ANP can reflect the accurate decision ▪ Practical method 	<ul style="list-style-type: none"> ▪ High complexity of proposed network results ▪ Greater complexity than AHP ▪ Time consuming
AHP	AHP is an MCDM approach to analyse weights and judgements in pair-wise comparison for solving multiple criteria and complex problems. AHP is an efficient and effective method to transform a complicated situation into elemental issue to develop a hierarchical model (T. L. Saaty, 1970; Thomas L. Saaty, 2003; Schmidt, Aumann, Hollander, Damm, & von der Schulenburg, 2015).	<ul style="list-style-type: none"> ▪ Simply a high level of suitability of the problem ▪ Can be used for multi criteria decision ▪ Suitable for this research for prioritization ▪ High level of universality ▪ Provide simple computational process ▪ Hierarchical structure ▪ Clear calculation for each criterion ▪ Suitable for this study due to collected data came from participants' experience 	<ul style="list-style-type: none"> ▪ Time consuming and high subjectivity ▪ Sometimes a part of data collection may lead to various results direction ▪ Need other data analysis to support results ▪ The more research participants involved, the complex weights and judgements are

4.11 Phase III: Interpretive Structural Modelling (ISM) and MICMAC

ISM is chosen for investigating the interdependencies among factors and validating the relationship within the system (Duleba, 2017). ISM implemented in Phase three with the objective of ranking the factors by their importance of improving service performance measurements. Thus, ISM has been employed to identify the contextual relationship among key proposed measurements on medical tourism industry for improving its service performance and MICMAC adopted at identifying between the factor influences other factors and the factors which were influenced by others in the graphical presentation (Debata et al., 2013). So, SEM (Structural Equation Modelling) could not apply in this study because it cannot test directionality in relationship and the arrows solely represented the hypothesis of causality within its system (Hair et al., 2016).

4.11.1 Fundamental of ISM and MICMAC

After prioritizing the proposed SSC performance measurements by using AHP, the objective of this study also aims to undertaken to determine insights about the collective understanding of these construct relationship.

ISM was first proposed by John N. Warfield in 1973 as a tool to analyze complex socio-economic systems (Warfield, 1974). It is renowned for identifying and analyzing the mutual relationships among various variables representing each research construct (Sage, 1977). ISM is typically used to decode the fundamental understanding of intricate situations or systems, drawing upon experts' experiences and knowledge (George & Pramod, 2014; Banha et al., 2017). As a modeling process, ISM scrutinizes the impact of individual elements on others to provide more profound insights through a map of complex relationships (George & Pramod, 2014). ISM has been widely applied across fields like policy analysis (Sage, 1977), management studies (Banha et al., 2017; Jain & Ajmera, 2018), vendor selection (Mandal & Deshmukh, 1994), knowledge management (Patil et al., 2016), among others.

4.11.2 Procedure for ISM and MICMAC

There are four principles for applying ISM techniques (Sharme et al., 2011). I) judgement of experts group requires to decide the elements are related. II) The overall structure is extracted from the complex set based on identified relationship (Banha et al., 2017; Attri et al., 2013). III) ISM also provides a graphical model (Attri et al., 2013). iv) it helps to impose and order the interaction of

complex relationship among several of elements of system. To develop a model, ISM model development procedures follow the literature review (Ajmera & Jain, 2019b; Kumar & Sharma, 2015; Raj, 2015; Taneja & Sushil, 2007). To exhibit the relationship among the refined results, the steps were undertaken as following:

I. Identification of elements

This step is to identify and derive the elements which relates to the problems and research objectives of this study from literature review and opinions from Thai JCI healthcare service providers.

II. Reachability matrix formation

The structural self-interaction matrix (SSIM) was developed. SSIM establishes contextual relationship and indicates the pair-wise relationship among all elements in system in binary form 0 and 1. Then, V, A, X, O allocated in SSIM to explicit the relationship (Raj, 2015; Warfield, 1974). The description of each symbol is explained in Table 29.

Table 29 Symbols relationship in ISM

Symbol	Explanation	The binary matrix
V	i influences j	0
A	J inflences i	1
X	Both I and j influence each other	1
O	There is no relationship between both variables	0

Source: Adopted from (Ajmera & Jain, 2019a; Taneja & Sushil, 2007)

III. Reachability matrix from SSIM of element is developed.

Matrix from SSIM needs to verify its transitivity for a key assumption or initial reachability matrix. Transitivity refers to the skeptical relationship which shows in such a way that if M relates to N and N relates to O, then M is related to O. When transitivity was determined and depicted as 1*, the final reachability would introduce to the level partition step.

IV. *Level partition on reachability matrix (Iteration process)*

The level partition is needed to carry out. Based on Warfield's study (1974) suggested that the reachability set and the antecedent set for each variable is derived from the final reachability matrix. The reachability set contains the variable itself and other variable it may impact, meanwhile the antecedent set composes of the variable itself and another variable which may impact it (Warfield, 1974, 2003). Once, the variable which both reachability and antecedent sets are the same, then it would be in the top-level of ISM hierarchy (Guo, Li, & Stevens, 2012). The allocated variables in the top-level were separated and the process would repeat until getting the level of each variable. When partition of each level of reachability matrix is done, then moving to the next step of digraph construction.

V. *Digraph construction*

An initial digraph is created by eliminating the transitive relationships from knowledge base. The conversion of flowchart in ISM needs to be reviewed to ensure that there is no inconsistency in model. Then, the final digraph is translated into a binary interaction matrix. The initial digraph is prepared for canonical form of reachability matrix. The digraph shows the interrelationship how bottom variable can influence directly and indirectly over other variables

VI. *Complete Interpretive Structural model*

The interpretive matrix and the digraph are conducted to get the total interpretive structural model. The element definition denotes to nodes and place in boxed in digraph. A digraph is depicted to display the relationships among elements in terms of nodes and lines of edges. The interpretation in cells of interpretive matrix is portrayed by the side of the respective links in the structural model. Finally, the final ISM model was reviewed for conceptual inconsistency and all relationships.

In addition, MICMAC analysis (Matrices d'Impacts Croises Multiplication Applique a un Classment) is a tool to analyse the driving and dependence power of variables (Ajmera & Jain, 2019b; Sharma & Bumb, 2021). MICMAC analysis would describe complex direction and depict graph which divided into 4 quadrants such as (see Table 3).

Table 30 Classification of MICMAC analysis quadrants

Quadrant	Group	Driving Power	Dependence Power
1	Autonomous	Low	Low
2	Dependent	Low	High
3	Linkage	High	High
4	Independent	High	Low

The key variable from MICMAC analysis would describe as ‘the key factors’ based on high driving power and be classified into linkage or independent quadrants (Ghosh & Mandal, 2019; Mandal & Deshmukh, 1994; Sharma & Bumb, 2021; H. Y. Wang, 2012). The analysed factors with low driving and dependence power are classified in the first quadrant or known as ‘Autonomous factors’. The second quadrant contains the high dependence power with low driving power factors, which would allocate in ‘dependent factor’. The third quadrant includes the ‘linkage factors’ which having both high driving and dependence power. The fourth quadrant which has the high driving power but low dependence power also known as ‘Independent factors’ (Mandal & Deshmukh, 1994).

4.11.3 Interpretive Structural Modelling (ISM) and MICMAC presentation

Presenting the results of the Interpretive Structural Modelling (ISM) and MICMAC analyses for the service supply chain performance measurement in the Thai medical tourism industry.

ISM results can be depicted in a hierarchy structure diagram. To construct the ISM model showing the relationships among various performance measurements in service supply chain. Each node in the diagram represents a performance measure, and the arrows indicate the relationships between

these measures. Performance measures at the top have significant influence on those below but are less influenced by them.

Alongside the ISM model, provide a clear description of each level in the hierarchy, explaining how each performance measure impacts others. A table format can be useful here, with columns indicating the performance measure, its influence on other measurements, and the level it occupies in the hierarchy. Then, to summarize an analysis of the overall ISM model. Discuss how the hierarchy of performance measures reflects the structure and function of the service supply chain in the Thai medical tourism industry.

MICMAC results are ideally represented in an Influence-Impact Map. To begin with a four-quadrant diagram to depict the influence (on x-axis) and dependence (on y-axis) of each performance measure. Each quadrant will classify performance measures as dependent, linkage, autonomous, or independent. Then, bringing Influence-Impact Map with a table summarizing each performance measure along with its influence and dependence scores and its classification based on the quadrant in which it falls.

Next step is providing an explanation of the Influence-Impact Map. Discuss the implication of each performance measure's placement in the specific quadrant and how this information can be used to enhance the service supply chain performance in the Thai medical tourism industry.

4.11.4 Rationale for adopting ISM and MICMAC

The rationale for employing Interpretive Structural Modeling (ISM) and Matrice d'Impacts Croisés Multiplication Appliquée à un Classement (MICMAC) in this study is substantiated by several reasons:

First, the medical tourism supply chain is characterized by a myriad of interconnected performance measures. Given the research limitations such as data accessibility, a limited number of target samples, COVID-19 related restrictions during data collection, and other constraints related to time and funding, a comprehensive methodology that can examine complicated interdependencies effectively is required (Duleba, 2017; Sage, 1977).

Second, the application of ISM facilitates a thorough understanding of the relationships between different variables and their impacts on each other. This is particularly relevant to complex fields like the medical tourism supply chain where understanding interrelationships is imperative (Warfield, 1974; Mandal & Deshmukh, 1994).

Third, MICMAC serves as a tool that provides a detailed visual representation of the relationships among the factors. It helps to distinguish the factors that influence others and those that are influenced, offering a comprehensive view of the dynamics of the supply chain (Debata et al., 2013; Patil et al., 2016). Moreover, these two methodologies offer a robust and systematic approach to navigate the medical tourism supply chain. This assists in strategizing for performance enhancement (Banha et al., 2017). Table 31 below also provide to support the comparison of each research analysis methods such as ISM, SEM and DEMATEL.

Thus, the combined approach of ISM and MICMAC provides a comprehensive, credible, and systematic methodology well-suited to delve into the intricacies and dynamics of performance metrics in the complex environment of the medical tourism supply chain.

4.12 Ethical considerations

This research was scrutinized the research protocol based on the General Data Protection Regulation (GDPR) guidelines and granted the ethical approval no. FREIC1920.12 by the University of Plymouth Faculty of Business Research Ethics Committee on 20th February 2020 before data collection stage. Author submitted the ethical approval to the participants beforehand and discussed roughly about the objective of this study. The consent forms were all signed before data collection in any type such as recording audio and video, note taking and photography. Any participant always has the right to withdraw from this study any time without any clarification for reason. Lastly, to protect the privacy of participant, data storage management plan also submitted through the FREIC committees and all collected data were anonymized both relevant direct and indirect personal identifications.

Table 31 Advantages and Disadvantages of different research methods; ISM, SEM, and DEMATEL

Data analysis methods	Description	Advantages	Disadvantages
Structural Equation Modelling (SEM)	Structural Equation Modeling (SEM) is a collection of statistical techniques that allow for the testing of a series of relationships between variables (measured variables and latent constructs) (F. Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014; Hair, Ringle, & Sarstedt, 2011).	<ul style="list-style-type: none"> • often used for testing and estimating causal relationships • examination of several relationships between different sets of variables • provides strong statistical evidence for hypothesized relationships 	<ul style="list-style-type: none"> • interpretation of results can be complex and not easily grasped by non-statisticians • large sample sizes for model estimation • measurement error is random and normally distributed, which may not always be the case
Decision Making Trial and Evaluation Laboratory (DEMATEL)	The Decision Making Trial and Evaluation Laboratory (DEMATEL) is a structured, interactive and visual method designed to depict complex problem settings in the form of a visible model (or structural model) (Atthirawong, Panprung, & Leerojanaprapa, 2018; Wu & Lee, 2007).	<ul style="list-style-type: none"> • Suitable for modeling complex systems • exploring the relationship between various factors • identifying cause-effect relationships and revealing feedback within the system 	<ul style="list-style-type: none"> • expert judgment may introduce a level of subjectivity to the results • complex and intensive • linear relationships among factors • Difficulty in Quantifying Influences
Interpretive Structural Modeling (ISM)	ISM was first proposed by John N. Warfield in 1973 as a tool to analyze complex socio-economic systems (Warfield, 1974). It is renowned for identifying and analyzing the mutual relationships among various variables representing each research construct (Sage, 1977).	<ul style="list-style-type: none"> • helps to visualize relationships and analyze the influence of different factors • creating a hierarchical structure • simplifies the complexity into a visually digestible digraph • accommodate both quantitative and qualitative • highlight the interconnections and dependencies among various elements of a system 	<ul style="list-style-type: none"> • high level of subjectivity • difficult to interpret and use effectively when dealing with a large number of elements • it does not provide quantitative measurements of these relationships • a static view of relationships among elements at a particular point in time.

4.13 Summary of Chapter four

The methodology chapter provides an in-depth analysis of the research philosophies, approach, strategies, and the overall research design of this study, focusing on the medical tourism industry's service supply chain performance measurements. This study primarily embraces the Pragmatism paradigm (Dewey, 1916). Pragmatism offers a more suitable approach by investigating different situations where generalization is inappropriate. The research approach of this study takes an 'abduction' route (M. Saunders et al., 2019), a combination of induction and deduction approaches. The deductive approach is used in relation to the problem statement, research questions, data collection, and data validation in the quantitative part. This approach facilitates a better understanding of the medical tourism supply chain management and allows identification of the service performance constructs, key success factors of the medical tourism industry, and explaining the causal relationships among variables from a theoretical perspective.

To supplement the weaknesses of qualitative and quantitative approaches at different phases, a mixed methods research strategy is adopted in this study. The qualitative research approach helps interpret potential participants' opinions and experiences in the medical tourism context, while the quantitative research method benefits the study in terms of numerical variables, especially during the prioritizing process. In terms of research strategy, this study employs survey and interview strategies based on the purpose of the study, research paradigm, and research questions.

The research design consists of three empirical phases. Phase one involves identifying medical tourism service performance measurements using thematic analysis. Phase two involves exploring and prioritizing the importance of each service supply chain management performance measurement on medical tourism supply chains using the Analytic Hierarchy Process (AHP). Lastly, phase three identifies the relationship among the top ten refined SSC performance measurements leading to medical tourism key success factors through semi-structured interviews. The ISM hierarchy model of MTSC performance measurement is built subsequently.

Chapter 5

Exploratory study results: Phase one

5.1 Introduction

This chapter provides an overview of the first empirical phase, with a specific focus on the identification of performance measurements within the medical tourism service supply chain. The construction of the proposed supply chain for medical tourism is deductively derived based on the principal themes of the service supply chain. Additionally, this chapter expounds on the methods of sampling, data collection, and data analysis used in the study.

Furthermore, this chapter illuminates the application of thematic analysis as a tool to discern proposed performance measurements. Subsequently, the findings of the first empirical phase are extensively discussed and elucidated. The outcomes of this empirical phase serve to validate the study and establish a reference point for the second phase, which entails the prioritization of Analytic Hierarchy Process (AHP) in next chapter.

5.2 Objective for exploratory study

The objectives of this exploratory study conducted using semi-structured interview approach which is associated in Chapter 1.

- 1) To identify the characteristics of medical tourism supply chain
- 2) To analyse the role of SSC objectives through the lens of medical tourism industry
- 3) To establish the SSC performance measurements towards medical tourism industry perspective

5.3 Empirical data collection using semi-structured interviews: Phase one

Author collected empirical evidence from potential respondents who have been involved in Thai Medical Tourism including healthcare service providers and tourism stakeholders. The semi-structured interview was selected to gather data based on tool appropriateness and expert's recommendations from pilot study. The interviews on empirical round were conducted between February-April 2020. As these interviews from random regions in Thailand (see Figure 19), author considered it worthwhile to observe and visit the potential gaps in Thai medical tourism industry. Author aimed to use the same participants since study phase one to phase three to maintain the consistent of expert judgements.

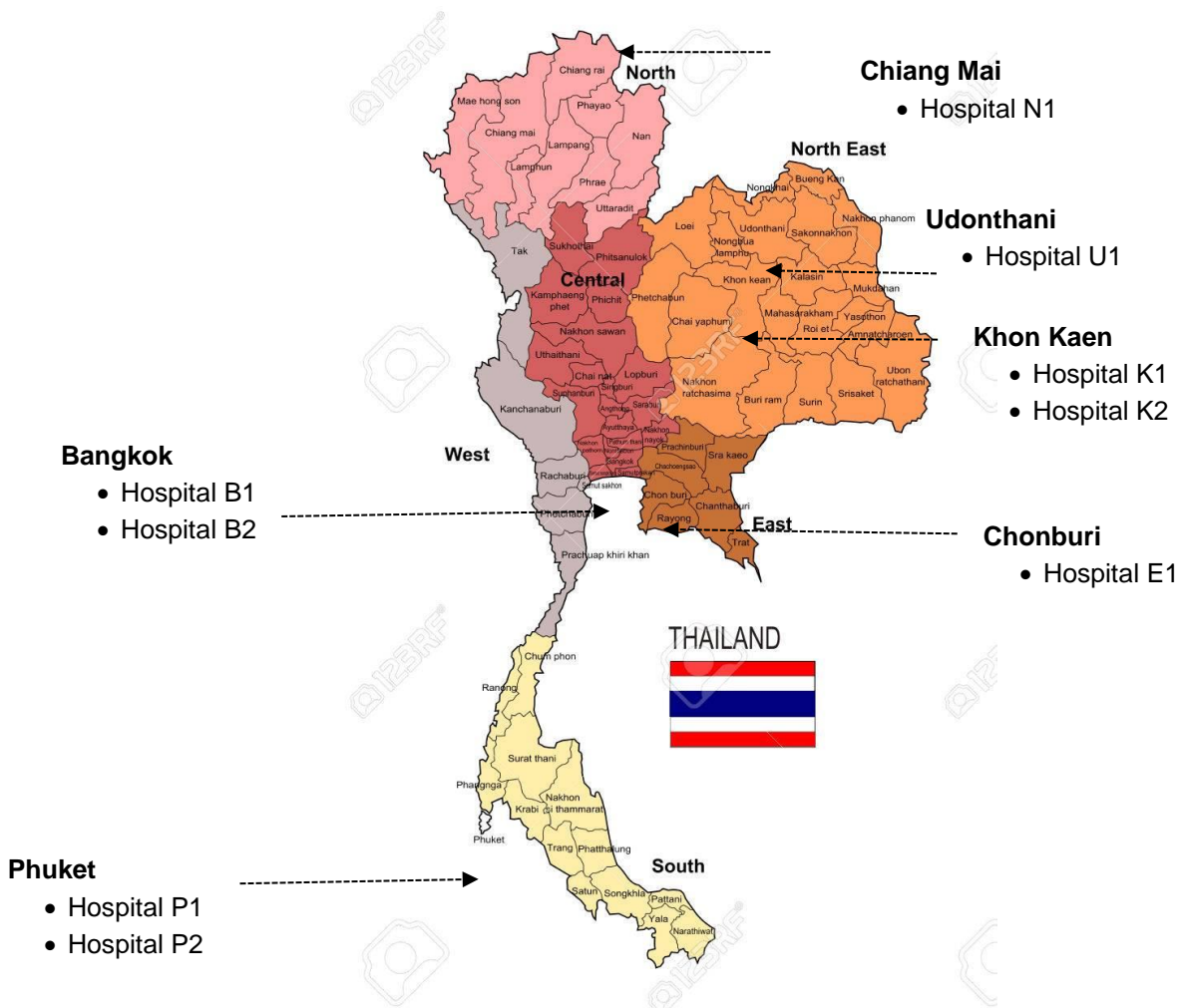


Figure 19 The route plan for empirical data collection

However, these reasons were considered for empirical data collection limitations: time, budget, quality of data, COVID-19 travel restriction, and interviewee's available time. Firstly, the author had the limited available time to carry out for the data collection because of the scholarship and UKVI visa regulations. Therefore, author critically needed to plan and managed time for travelling to the sites and having interviews. Secondly, the author needed to ensure the quality of data that author attained enough data and essential information for the empirical round. Thirdly, the interviewee's available time is the critical reason for this study. The target groups almost all have been in the middle- or top- levels positions of their organisations to elicit essential insights. Therefore, the author required to allow some time for his/her consideration until the appointment

is given. Then, author travelled directly on sites and had panel discussion with them. For these reason after careful consideration, semi-structure interview as face-to-face communication is a suitable method to conduct the primary data due to the Thai culture and tradition for meeting the senior interviewees.

A revised interview guild from pilot study was edited and administered to potential respondents 3-5 days before an appointment to their secretaries. The semi-structured interview guide was created to encourage potential respondents focusing on the topic on track and gathering their opinions and judgements they have experienced. The interview guide comprises of two sections (see Appendix 7). It first obtains general information about potential respondents or interviewees and their organization, then asks specific questions about SSC performance measurements and key success factors of medical tourism. Trends and opportunities for Thai medical tourism industry were asked and explained about the impacts of COVID-19 disruption have faced. Finally, the semantic differential rating scale questionnaires (see Appendix 8) were distributed to gather the subjective opinions to measure and rank how SSC performance measurements drive their organizations. Moreover, probing questions are asked to gain deeper and insightful interviewees' opinions and experiences, as necessary.

To achieve the research objectives of SSC performance measurement development, author selected semi-structured interview based on literature reviews and expert's recommendation from pilot study to obtain the essential information within limited time. Purposive sampling was chosen in this empirical data collection to recruit the appropriate potential respondents (Saunders et al., 2015). Purposive sampling was represented to identify who were selected to be knowledgeable about medical tourism industry based on the name list from JCI.

The inclusion criteria for recruiting suitable respondents were:

- 1) The participants should come from the medical tourism industry and be directly involved healthcare service providers.
- 2) The selected healthcare service providers or hospitals must have *JCI Accreditation*.
- 3) They must have more than 5 years' working experience to ensure that the researcher gets enough understanding and knowledge from samplings.

- 4) Participants as samplings for the empirical data collection were from academics and practitioner and be involved in healthcare, tourism, logistics, supply chain and management fields.
- 5) In terms of the practitioners' opinions, the researcher selected the samplings who positions in the middle-or top-level of staffs in organisations to ensure the knowledge and validate the service supply chain management performance.
- 6) For academics' judgement, the researcher opted to mainly recruit the academics from school of medicine and business in Thailand because their judgement and opinion would affect directly to the main context of Thai medical tourism.

According to the nature of research questions is vary based on the topic complexity, there are no criteria for the specific number of sample size (Saunders et al., 2015). Francis et al. (2010) mentioned that the initial sample analysis for interview should have at least 10 interviews. The first step of this study, participants were chosen using a purposive sampling technique. The data collection started with the healthcare service providers in Bangkok which is a focal city in Thailand and has good connections with almost all relative business partners or hospital chains. Based on the criteria for selecting participants (see above), healthcare service providers without JCI accreditation were excluded from this study. It means that author distributed the contact for all population of 9 JCI accredited hospitals. Due to the plight of COVID-19 pandemic since the beginning of year 2020, author got 20 participants responses from random parts of Thailand such as Bangkok, Chiang Mai, Udonthani, Khon Kean, Phuket and Samui Island.

After conducting data from 6 regions of Thailand based on the above criteria for selecting participants, author rearranged the raw data by verbatim transcriptions and took notes. Author found that collected data indicating the saturation point. Thus, author stopped conducted further interviews resulting in a total number of sample size of 20 participants.

5.4 Data analysis with thematic Analysis process

To fill the gap of qualitative study, the reliability test is required to ensure the integrity of the results. Verbatim transcriptions were carefully taken notes and read to confirm the irrelevant data removal. Then, the initial codes were generated. To achieve reliability, author employed two coders along with the steps of thematic analysis.

Due to the stated limitations and all experts are deliberately chosen including representatives from Phuket and Bangkok, Inter-Rater Reliability or IRR was employed to achieve reliability. *Inter-rater reliability or IRR* refers to the level of agreement between two or more than two raters/judges (Cohen, 1960). If all judges or observers determine whether agree the same directions IRR is or closer to 1 and disagree is 0. In this study, two main coders determined the refined measurement scales from empirical data collection with practitioners. Both coders looked through all codes and gave their opinions whether to “measurement for medical aspects in MTSC” and “measurement for non-medical aspects in MTSC” (which options are the nominal variable). The level of agreement between two coders for each refined measurement is analysed using Cohen’s kappa. Before running a Cohen’s kappa to ensure the reliability, author checked the basis of assumptions to use Cohen’s kappa which meets the following reasons (Cohen, 1960):

1. The judgements that are made by two raters should be measured on a nominal scale and the categories need to be mutually exclusive.
2. Both raters assess the same observations.
3. Each response variable must have the same number of categories and the crosstabulation must be symmetric. In this study author made it into a 2x2 crosstabulation.
4. The two raters are independent. One rater's judgement does not have impact over the another rater's judgement).
5. All observations and judgements are evaluation by the same raters until the analysis part had been done

Since the results showed a substantial strength of agreement between the two coders, which resulted in an IRR of $k = 0.806$ (Cohen, 1960) through SPSS (see appendices A.1). To cross-check the agreement, some random staffs in medical tourism industry from Chiang Mai, Khon Kaen and Udonthani provinces were asked and raised the potential perceptions that they were satisfied the agreements from both coders in a similar manner without personal bias.

5.5 Results of thematic analysis

5.5.1 Characteristics of participants

The Table 32 below demonstrates the detail information of each interviewee consisting of region location of Thailand, name of hospitals/tour operator companies, interviewees' position, roles in their organizations and year of experience.

Table 32 Characteristics of participants in empirical data collection

Company	Interviewee's position	Role and responsibility in interviewee's position	Year of experience
Hospital B1 (Bangkok)	1. Medical Technologist	<ul style="list-style-type: none"> Fully involve in aspects about overall infertility treatment Supply sourcing 	7
	2. Medical Technologist (Laboratory)	<ul style="list-style-type: none"> Supply chain planning and control/ sorting supplier Facilitate lab results to Gynecologist 	5
	3. Medical Technologist (Laboratory)	<ul style="list-style-type: none"> Supply chain planning and control/ sorting supplier 	5
	4. Nurse	<ul style="list-style-type: none"> Assisting doctor to deliver treatment to medical tourists Supply allocation 	7
	5. Obstetrician and Gynaecologist, Infertility Treatment Specialist/ director	<ul style="list-style-type: none"> Assessing the potential suppliers/ setting the criteria assessment for medical treatment each step Obstetrician and Gynecologist, Infertility Treatment Specialist 	21
Hospital P1 (Phuket)	6. Head of department	<ul style="list-style-type: none"> Fully involve in aspects about strategic marketing and international patients. 	14
	7. Senior international marketing	<ul style="list-style-type: none"> Focus on international market penetration/ find agents or medical facilitators from partner in foreign countries/ maintain contract with agents Manage non-clinical supply chain/ customer relationship management, intermediary and agents 	23

Table 32 Characteristics of participants in empirical data collection (Cont)

Company	Interviewee's position	Role and responsibility in interviewee's position	Year of experience
Hospital B2 (Bangkok)	8. Chief Medical executive/ Vice hospital director	Assessing the potential suppliers/ setting the criteria assessment for medical treatment each step	10
Hospital P2 (Phuket)	9. Business development (Chinese)	<ul style="list-style-type: none"> Focus on international market penetration/ find Chinese agents or medical facilitators from partner in foreign countries/ maintain contract with agents Customer relationship management/intermediary/ offline and online communication 	7
	10. Vice of hospital director	<ul style="list-style-type: none"> Quality analysis control Focus on supply chain side both medical and non-medical sorting /find agents or medical facilitators from partner in foreign countries/ maintain contract with agents 	5
Hospital E1 (Chonburi)	11. Chief Medical executive/ Vice hospital director	<ul style="list-style-type: none"> Assessing the potential suppliers/ setting the criteria assessment for medical treatment each step Financial and supply chain management 	25
Hospital U1 (Udonthani)	12. Hospital director	<ul style="list-style-type: none"> Administer in general and manage all issue in the big framework. supply sourcing and recruitment 	23
Hospital K1 (Khon Kaen)	13. Hospital director	<ul style="list-style-type: none"> Medical leader (Cardiology specialization) Quality analysis in Big picture 	15
Hospital K2 (Khon Kaen)	14. Hospital director	<ul style="list-style-type: none"> Provide the big picture and manage all issue within hospital. Manage all medical areas (Ear Nose Throat) 	25
	15. General service facilitator	<ul style="list-style-type: none"> Facilitate medical tourists, plan about upcoming service Human resource management 	5

Table 32 Characteristics of participants in empirical data collection (Cont)

Company	Interviewee's position	Role and responsibility in interviewee's position	Year of experience
Hospital N1 (Chiang Mai)	17. Head of Department (International Digital Marketing)	<ul style="list-style-type: none"> • Manage marketing strategies/digital marketing • Chanel penetration 	5
Hospital N1 (Chiang Mai)	18.Head of Department (International Medical Service)	<ul style="list-style-type: none"> • Human resource management/ flow of service and provide service on request for customer 	5
	19.Hospital director	<ul style="list-style-type: none"> • Quality analysis control • Work in the strategical level, manage critical decision • Human resource management/ strategy management 	12
	20. Head of Department (Ancillary support)	<ul style="list-style-type: none"> • Work in the strategical level, ancillary support and general support division • Sorting medical devices, sorting suppliers, manage supplier contracts, KPI management, transportation management, X-ray equipment maintenance 	5

The thematic analysis results are discussed in this section from 20 experienced medical tourism practitioners across different parts such as North, Northeast, Central, East and South.

In this study, the process of analysis started with deductive coding, using existing literature on Service Supply Chain (SSC) to generate specific themes, including seven main themes and keywords provided by experts. These themes were then explored in the data sources using the axial coding function of the MAXQDA software.

After the coding process, the actual analysis commenced. This involved a detailed review of the main themes and sub-themes, refining and categorizing all relevant codes into suitable themes. Concurrently, author continuously reassessed and constructed a thematic map to confirm the appropriate classification of data under each theme. This process was carried out in close

consultation with field experts until the completion of the thematic analysis. Subsequently, an analysis report was generated.

To visualize the identified main themes and their sub-themes (or measurements), the 'Code Matrix Browser' was utilized. This tool showcases the themes discussed by participants, their recurrence, and the relationships between them. This resulted in seven themes and 41 sub-themes, represented visually in Figure 20.

The Code Matrix Browser also offers insights into the frequency of code assignments across the interview documents. Each document is represented by a column, and each code by a row. The presence of a code in a document is indicated by a circle, and the size of the circle corresponds to the number of times the code was assigned. This size thus denotes the frequency of code occurrence. The symbols' sizes and the overall matrix visualization were supported by discussions with research experts in the medical tourism industry, based on literature review and gathered data.

Following the thematic analysis process, a detailed explanation of each theme was provided in the next section, thus comprehensively mapping the research landscape. This analytical approach offered robust, multi-dimensional insights into the Service Supply Chain within the medical tourism industry.

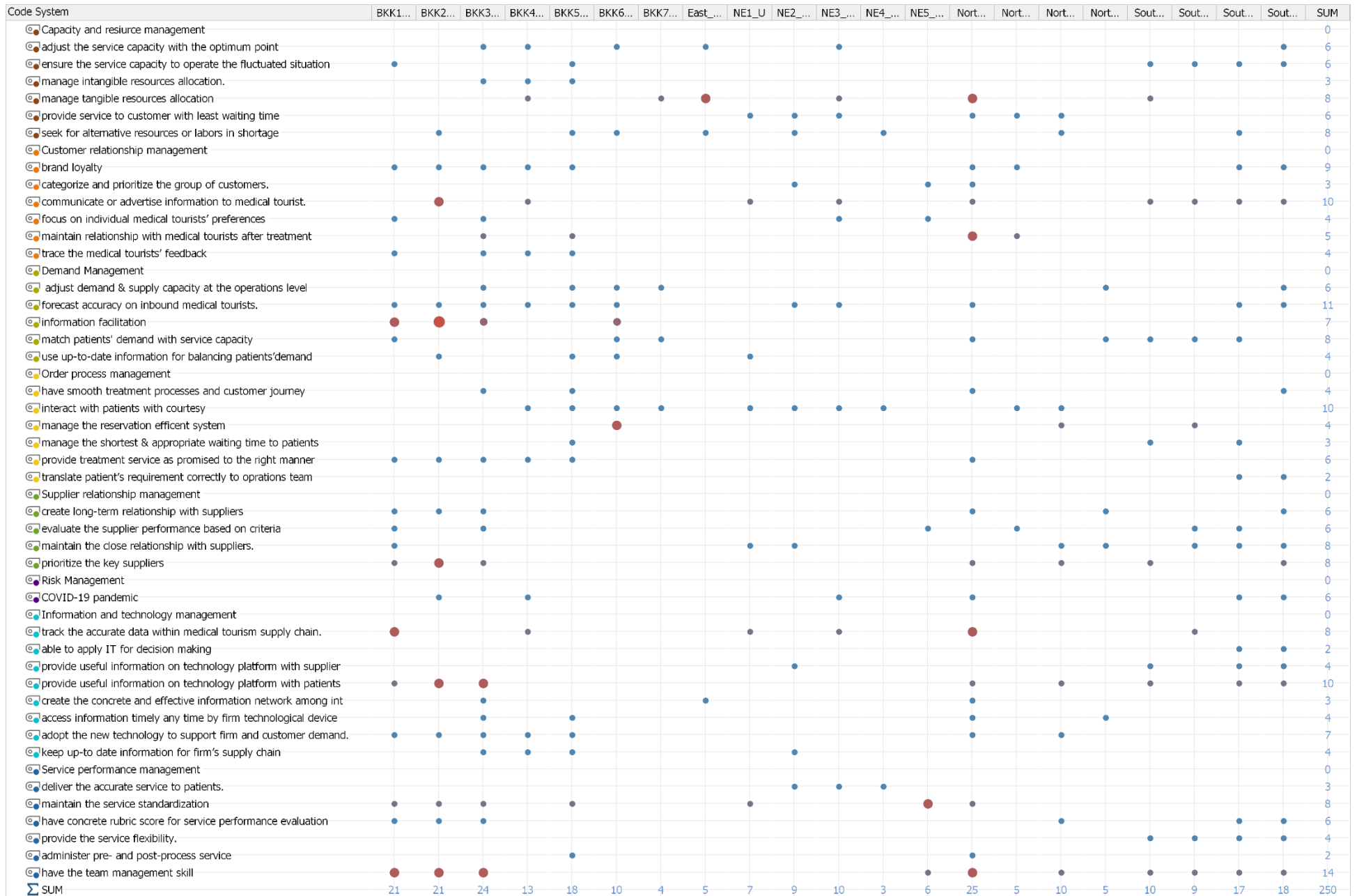


Figure 20 The result of themes and sub-themes of this study finding

This section presents the results of the thematic analysis. Data gathered from 20 experts across Thailand (as described in section 5.1) has been processed and interpreted. The empirical findings have been classified into seven principal themes, grounded in the comprehensive literature review. In the ensuing sections, each major theme is further distilled to reveal the associated performance measurements. In each theme, the overview of empirical evidence has been presented three columns based on King, Horrocks, and Brooks (2018), the first-order codes from the interview script, the second order codes are the codes for building SSC performance measurements and the third column represents the obtained evidences from interview.

5.5.2 Exploring demand management performance measurements (DM)

To begin with, demand management process in the medical tourism supply chain takes part in activities of identifying and forecasting the healthcare demand, estimating the amount of inbound medical tourists and general travelers, and additionally matching this given information to the firm's resource and capacity (Ellram et al., 2004). In the service industry as well as medical tourism, the successful demand management process needs to handle with the uncertainty of demand patterns from the characteristics of service. Moreover, applying the accurate demand information can benefit the planned capacity (Boon-itt & Pongpanarat, 2011; Sengupta, Heiser, & Cook, 2006).

To apply demand management process in medical tourism supply chain, firms are required to investigate the estimated number of medical tourists and potential travelers from statistical data for preparing the healthcare services and the maintenance of accommodation or tourist attractions. In terms of healthcare perspective, the administrative team of hospitals can implement the demand management activity to plan and manage the professional, medical, and surgical devices to serve the patients for invasive and non-invasive treatments. It can also help to control the peak or low point by using appointment system and promoting the differential price scheme (Baltacioglu et al., 2007; Maull et al., 2012).

By the same token, the individual unit of tourism industry can take advantage from implementing the demand management of service supply chain management such as tourism authority or Ministry of Tourism investigate the number of potential tourists and provide the maintenance of tourist attractions. Some area is required to annually support and reconstruct to support medical tourists or increasing patients.

The medical tourism industry is the combination between healthcare and tourism industries. Both industries need the work parallel with collaboration among the chain. If they work individually without collaboration, each business will generate the same revenue and have less opportunity to survive in the dynamic market. This study was conducted during the plight of COVID-19 pandemic. Therefore, it is important for both industries to keep up-to-date information for encouraging and preparing the next steps or avoid uncertainty of demand.

In terms of developing the potential performance measurements of demand management on medical tourism supply chain, the performance measurements are shown in Table 33 below.

Almost all the participants highlighted that the potential performance measurements were needed the effective skills of demand management. Five sub-theme or performance measurements were identified as seen in Table 17. Even though there have been many treatments services availability in Thailand, medical tourists basically preferred to obtain the treatments based on the tourist attraction locations and specific medical professionalism. Therefore, the performance of demand management was a major challenge through the medical tourism industry could be assessed. Additionally, some healthcare service providers had the different target groups of medical tourists based on the marketing system and geographical areas. One of the respondents claimed:

“[...] the offer treatment packages in South of Thailand were lower than North-East part, but CLMV people would obtain the medical services within North-East area of Thailand because it is closed to Laos border and easy to drive through Thailand-Laos immigration borders. Additionally, Cambodian, Vietnamese, Laos, Myanmar people are subject to travel to Thailand as the large groups and spend time on average approximately less than 5 days. [...]”

The respondents also mentioned about adjusting demand and supply capacities at the operational level in healthcare service providers. For example, the physicians or therapists are allocated to the uncertain amount number of patients during high season in Phuket. Therefore, incorporating the substance networks among hospital chains to exchange or allocate human resource is found to be counted as one of demand management performance measurement. One of respondents explained that

“[...] The key point to maintain the service standardization is not solely the quality standard from JCI accreditation, we also need to manage the medical tourist demand to match with our professionalism and human resource capacities. During high season, our hospital chain within the same area also deliver the different treatments to medical tourists to guarantee the customer satisfaction and less waiting time for obtaining their treatment [...].”

One of the challenges was the fluctuated number of medical tourists inbound and the medical facilitators were not based in Thailand. So, the ability of using up-to date information for balancing demand is also associated with the above statements. One of respondent as the medical facilitators made the following comment.

“[...] We cannot deny that ‘the up-to-date information’ from healthcare service providers are so crucial for medical tourist’s decision. We would offer packages and marketing information to potential medical tourist based on their updates. We expected the most accurate and latest information should always be ready when the potential patients needed. So, some hospitals may decide to have medical facilitator or sales representatives from their own hospital in our area to promote the prompt responses. [...].”

As the consequence, it is visualized that the consistent repetitions or frequency from the in-depth interviews were clearly proven by the respondents’ comments owing to its substantial proven with the proposed performance measurements.

Table 33 Proposed demand management performance measurement for MTSC

First-order codes	Proposed demand management performance measurement (C1)	Frequency*
<i>‘During high season, our hospital chain within the same area also deliver the different treatments to medical tourists to guarantee the customer satisfaction and less waiting time for obtaining their treatment’</i>	DM 1: The ability to focus on forecast accuracy on inbound medical tourists.	11
<i>‘The key point to maintain the service standardization based on professionalism and human resource capacities and the quality standard from JCI accreditation’</i>	DM 2: The ability to match patients’ requirement with healthcare service provider’s capacity.	8
<i>‘some hospitals may decide to have medical facilitator or sales representatives from their own hospital in our area to promote the prompt responses’</i>	DM 3: The ability to facilitate the healthcare & tourism information to the patients.	7
<i>‘ We also need to manage the medical tourist demand to match with our professionalism and human resource capacities’.</i>	DM 4: The ability to adjust demand & supply capacity at the operations level e.g. The physicians are allocated to the uncertain amount number of patients.	6
<i>‘We would offer packages and marketing information to potential medical tourist based on their updates’</i>	DM 5: The ability to use up-to-date information for managing and balancing patients’ demand among MTSC.	4

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

5.5.3 Exploring capacity and resources management performance measurements (CAP)

Capacity and resource management process is about the competence of managing, planning, and allocating the tangible and intangible resources (Ellram et al., 2004; Baltacioglu et al., 2007). Current study appears to support the notion that capacity and resource management on the medical tourism supply chain perspective has been involved in activities of resource allocation, utilization, and schedule management. To develop the performance measurements of capacity and resource management on medical tourism industry, resource utilization is mainly a criterion which assesses the how efficiently intangible and tangible resource are managed for delivering the service (Boonitt et al., 2017).

The difficulty of capacity and resource management on medical tourism industry is also to balance demand and firm capacity effectively within the constraints, facilities, and firm operations (Cho et al., 2012). In the medical tourism industry perspective, the effective schedule management skill is essential for service supply chain. The effectiveness of scheduling has great significance and impacts on capacity utilization, customer satisfaction and supplier performance (Cho et al., 2012). Additionally, service scheduling is also vital for labor allocation (Mehrparvar et al., 2014).

The participants identified that the potential performance measurements were needed the effective skills of capacity & resource management. Six sub-theme or performance measurements were identified as seen in Table 34. Capacity and resource management is one of the most important aspects among the MTSC. Almost all participants from medical tourism industry agreed that the alternative resource management skills especially during high season was required. One of participants supported this explanation as follows:

“[...] The medical tourism involves several suppliers as well as the medical tourists who start the chains and input their requirement. One requirement that our team needs to do is make sure our medical and non-medical services are sufficient when medical tourists are obtaining treatments here. For example, during shortage time, we strongly need to incorporate with other hospital chains as alternative partners to provide the medical service to patients. Another example is the language management issue. Normally, our hospital has 5 languages to be ready at the service points but in case that the patients cannot communicate among the provided 5 languages, our language support team will allocate call-center interpreter within 5 mins and next 20 mins the

interpreter would come at the reception with prompt service to translate patients' requirement to physicians [...]"

Another participant also mentioned that the proposed performance measurement could be established about waiting time management skill. In this study, author agreed with experts that waiting time and lead time are classified as the different terms in this industry. In the general context of SCM, lead time means the total time which counts since the starting point until the end of its chain. On the other hand, waiting time refers to the length time between when medical tourists come to the service point until the start of a process obtaining their medical services. A participant explained the reason for the discussion above as follows (See Figure 21):



Figure 21 The difference between ‘waiting time’ and ‘lead time’

“[...] As from my experience, more than 80 percent of patients would feel impressive if they got their treatment with the short waiting time which is the amount of time between their arrival to meet the physicians not until its conclusion. The point is medical tourists almost all expect to consult with doctor directly because they might wait too long in their home country. So, we have been raising this issue to promote as our competitive advantage. [...]"

Table 34 Proposed capacity and resources management performance measurement for MTSC

First-order codes	Proposed capacity & resources management performance measurement (C2)	Frequency*
<i>'The medical tourism involves several suppliers as well as the medical tourists who start the chains and input their requirement'</i>	CAP 1: The ability to manage tangible resources allocation.	8
<i>'our language support team will allocate call-center interpreter within 5 mins and next 20 mins the interpreter would come at the reception with prompt service to translate patients' requirement to physicians'</i>	CAP 2: The ability to manage intangible resources allocation.	3
<i>'we strongly need to incorporate with other hospital chains as alternative partners to provide the medical service to patients.'</i>	CAP 3: The ability to seek for alternative resources or labors in case the shortage happens.	8
<i>'One requirement that our team needs to do is make sure our medical and non-medical services are sufficient when medical tourists are obtaining treatments here.'</i>	CAP 4: The ability to ensure the service process has sufficient resources and service capacity to operate the fluctuated patients' demand in the most cost-effective manner.	6
<i>'As from my experience, more than 80 percent of patients would feel impressive if they got their treatment with the short waiting time which is the amount of time between their arrival to meet the physicians not until its conclusion.'</i>	CAP 5: The ability to provide service to customer with least waiting time.	6
<i>our language interpreters would come at the reception with prompt service to translate patients' requirement to physicians</i>	CAP 6: The ability to adjust the service capacity with the optimum point between peak and minimum points of demand.	6

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

5.5.4 Exploring customer relationship management performance measurements (CRM)

Customer relationship management process is about the ability to communicate effectively within firms and customers (Cho et al., 2012). This process also needs to create medical tourists demand and facilitate tangible and intangible resources within healthcare service providers (Ellram et al, 2004). Every patient has individual preference, thus, good understanding patient's demand and retain close relationship are required for seamless operations (Ellram et al., 2004). Customer relationship management process helps improve service firm performance by managing medical tourist's expectation, providing input for service delivery, and maintaining the customer royalty and long-term relationship (Boon-itt el al., 2017).

According to the distinctive results in this theme, the proposed performance measurement that almost all respondent mentioned referring to 'the ability to communicate or advertise their useful information to potential medical tourists (see Table 35).

A respondent from hospital in Phuket province explained that one of the performance measurements in customer relationship management context, it is basically about the marketing and advertisement communication which is also confirm the study of Momeni et al (2018). A respondent described as follows:

"[...] Customer behavior has been changed from the past. In the past, medical facilitator has a significant role affecting the potential medical tourist's decision. Nowadays, potential medical tourists intend to elicit their information by themselves from hospital's website and our team. Therefore, prompt medical treatment information and non-medical service offers (e.g., hotel, visa, tourist attraction) can effectively drive our customer demand [...]"

Table 35 Proposed customer relationship management performance measurement for MTSC

First-order codes	Proposed customer relationship management performance measurement (C3)	Frequency*
<i>‘Customer behavior has been changed from the past. In the past, medical facilitator has a significant role affecting the potential medical tourist’s decision.’</i>	CRM 1: The ability to focus on individual medical tourists’ preferences and satisfaction.	4
<i>‘Nowadays, potential medical tourists intend to elicit their information by themselves from hospital’s website and our team’</i>	CRM 2: The ability to communicate or advertise information to medical tourist.	10
<i>Brand loyalty associated with marketing and advertisement communication with the patients who used to obtain the medical treatments.</i>	CRM 3: The ability to create the effective relationship with customer by brand royalty.	9
<i>‘ We have tried to turn this point into the opportunities by offering the special packages for the next hospital visits and exclusive discounts for inviting their friends and family’</i>	CRM 4: The ability to trace the medical tourists’ feedback to improve the medical tourism supply chain.	4
<i>‘After obtaining services, the medical tourists can be our indirect marketers using their testimonials and providing their perceived service quality to others by word-of-mouth.’</i>	CRM 5: The ability to maintain relationship with medical tourists after their treatment.	5
<i>‘There have several different cases from all over the world, every medical tourist has their own service preferences.’</i>	CRM 6: The ability to categorize and prioritise the group of customers.	3

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

The finding also supports the results of studies by Wang (2012) and Zarel & Maleki (2019) and Walker (2001) that another important performance measurement should be raised about brand loyalty relationship. Brand loyalty cannot be objectively evaluated, but brand loyalty has represented the influence on customer's positive value perception. A respondent from hospital in Chiang Mai province claimed as follows:

“[...] Operationally, brand loyalty refers to the patient's cognitive appraisal of our service. Brand loyalty associated with marketing and advertisement communication with the patients who used to obtain the medical treatments. After obtaining services, the medical tourists can be our indirect marketers using their testimonials and providing their perceived service quality to others by word-of-mouth. We have tried to turn this point into the opportunities by offering the special packages for the next hospital visits and exclusive discounts for inviting their friends and family. [...]”

In addition, the interviews from experts in Khon Kaen province are also highlighted about the medical tourists' individual preferences. Even though medical safety and price are the main points of decision, medical tourists would perceive value varying on the indirect intentions during pre- and post-recuperations, nearby tourist attraction for their accompany like family and luxurious service e.g., airport pick-up and limousine services to hospital. A hospital director made the following comments:

“[...] Our hospital has the vision of providing international medical services based on JCI with mankind. Our medical tourists are treated and got the warm welcoming. Our staffs also offer services align with the hospital core value. There have several different cases from all over the world, every medical tourist has their own service preferences. So, all facilities and zones are divided into special categories e.g., luxurious living room, Local Thai food court, pick-up service from home to hospital, environmental decoration, prayer rooms for each religion, courtesy service from staff every floor at the escalators, nurses escort service and so forth [...]”

5.5.5 Exploring order process management performance measurements (OPM)

Order process management is the ability to respond the customer demand, check the order status, communicate with customer, and fill the order in order to delivery treatment to medical tourists (Lambert et al, 1998 cited in Mehrparvar et al., 2014). This is the first activities for any firm which happens through various patterns such as on-site at healthcare service provider, reservation through website, and hospital applications (Cho et al., 2012). This process is vital to determine the medical tourists' orders and specifications, every single detail of order is converted into useful information and passed through the operations parts (Baltacioglu et al., 2007). Order process management helps improve the decreased service order lead time, manage the cycle time of service and customer service order paths (Cho et al., 2012). This confirms the findings of several prior research that offering services with courtesy is the substantial competitive advantage for Thai medical tourism (Debata et al., 2015; Momeni et al., 2018; Wang et al., 2012; Fetscherin & Stephano, 2016). Almost all participants raised that the kind, hospitality, luxurious services with courtesy as one of the main recommended performance measurements for medical tourism industry. They explained that it could motivate medical tourists to the positive and valuable feedbacks. One of participants, hospital directors, shared his ideas as follows:

[...] “We always highlight the importance of kindness, attentive interactions and service readiness to individual medical tourists. We can ensure that we have been trying our best to deliver great services aligning with promised medical treatments every day, which reflects positively on the hospital reputation and brand royalty” [...]

Table 36 Proposed order process management performance measurement for MTSC

First-order codes	Proposed order process management performance measurement (C4)	Frequency*
<i>'A big picture of service flowchart may apply all organizations, as you know 'one size fit all plan' cannot implement anymore due to the dynamic changes of medical tourists' purchasing behavior.'</i>	OPM 1: The ability to process service order entry or translate patient's requirement correctly to the operations team.	2
<i>We have more than 20 administration staffs especially for international patients to deliver prompt service via online and at service points in hospital</i>	OPM 2: The ability to manage the reservation system efficiently through up-to-date technology system.	4
<i>'We always highlight the importance of kindness, attentive interactions and service readiness to individual medical tourists'</i>	OPM 3: The ability to interact with patients with courtesy.	10
<i>'If we can manage the reservation system effectively by contacting directly with patients, it is more 70% chance of patients' decision'</i>	OPM 4: The ability to provide treatment service as promised to the right patients, in the right place and at the right time.	6
<i>'The reservation system is available 24/7 and convenient for both potential patient and physician contexts.'</i>	OPM 5: The ability to manage the shortest or appropriate waiting time to the patients since placing order entry through reservation system until finishing treatment services.	3
<i>'We can ensure that we have been trying our best to deliver great services aligning with promised medical treatments every day, which reflects positively on the hospital reputation and brand royalty'</i>	OPM 6: The ability to have smooth treatment processes and customer journey	4

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

According to the interviews, author found that some participants had understood about the order process management concept based on their routine activities. They did not differentiate between order process management and service performance. Thus, they tended to draw all concept together and assess the performance in a big picture. Sometimes, the unexpected issues happened, and patients faced with bumpy process and confusion. That is the main reason to propose the measurement about the ability to offer the smooth treatment processes and customer journey. One of participants stated:

“[...] In my opinion, I have just found that order process management performance and service performance management, these are different to evaluate from each department for two years before. A big picture of service flowchart may apply all organizations, as you know ‘one size fit all plan’ cannot implement anymore due to the dynamic changes of medical tourists’ purchasing behavior. We have adjusted plan and divided into two main sections: services for domestics or living expats and services for potential international patients. We have more than 20 administration staffs especially for international patients to deliver prompt service via online and at service points in hospital [...].”

The participant from Khon Kaen province also suggested a proposed performance measurement which was about reservation system as follows.

“[...] Based on my experience in medical tourism industry, one of the competitive advantages of our hospital is the effective and up-to-date online system management for patients to choose their appointment and medical packages. The reservation system is available 24/7 and convenient for both potential patient and physician contexts. Patients can opt to choose the physician, medical technology preferences, bookable arrival slot, VIP lounge and room for their accompany person. If we can manage the reservation system effectively by contacting directly with patients, it is more 70% chance of patients’ decision [...].”

5.5.6 Exploring supplier relationship management performance measurements (SRM)

Supplier relationship management is the ability to manage, develop, and retain the relationship with suppliers (Chopra & Meindl, 2004). Supplier relationship management is the core activity which supports firms to plan, source and manage the necessary resource before handling to the operations process. This process is also related to capacity and resource management and order

process management (Baltacioglu et al., 2007). It is important to maintain the service-level agreement from supplier to be prepared for customer orders. In terms of improving the supplier relationship management performance, healthcare service providers need to build good relationships with supplier (Zhang et al., 2011) and share essential information among suppliers and coordinate service development, sourcing, planning through the firm's supply chain (Chopra & Meindl, 2004). Moreover, having sustainable and reliable relationship with suppliers in medical tourism supply chain can avoid an occurrence and failure in service delivery (Cho et al., 2012).

Regarding to the objectives of this study, author focuses on the service supply chain management based on medical tourism supply chain mechanism. Random experts from in-depth interviews suggested to propose the performance measurement in general perspective because the performance measurement in manufacturing and service cannot implement at the same area. Therefore, four proposed performance measurements in supplier relationship management theme are included as above in Table 37. Additionally, the four proposed performance measurements would implement in the general area of medical tourism supply chain. Below is the response of the participant, experienced more than 10 years, summarizes the proposed performance measurement about supplier relationship management theme:

[...] So far, there have been several sources of suppliers and different inventory from individual supplier as well based on the nature of medical tourism supply chain. The ability to evaluate the supplier performance is vital. It would have the supplier assessment from the procurement department for example, some hospital has ranking score for medical facilitators to offer the commissions or scoring the medical retailer based on their deals and discounts [...]

The following statement from the medical retailer of AA company, who met randomly during field trip observation, she also pointed out about the performance assessment from one of author visited hospitals that:

[...] Some hospital, they have the small available spaces for new medical devices, and they do not want to pay for the large number of budgets for medical devices maintenance in long term of time. Therefore, they established the scheme to maintain the close relationship with us by offering the partnership programme based on the suitable mutual benefits. For example, we also provided the rental medical devices to them with the contract for the specific period [...]

However, having the close relationship with suppliers may not always provide a straightforward gain that organisation needed. The ability to prioritise the key suppliers to increase the medical tourism supply chain quality still exists. One of participants, head of department, highlighted that:

[...] Only in a sense that our hospital may save some budgets based on the mutual benefits with the potential suppliers, but we need to keep it in mind that we still need to prioritise the key suppliers who helps us having the smooth supply chain and increases our customer satisfaction. From my point of view, we still evaluate supplier's performances based on the ability to make us getting better competitive advantages rather than the attractive temporary discounts from medical sales representative just only few years [...]

Table 37 Proposed order process management performance measurement for MTSC

First-order codes	Proposed supplier relationship management performance measurement (C5)	Frequency*
<i>we still evaluate supplier's performances based on the ability to make us getting better competitive advantages rather than the attractive temporary discounts from medical sales representative just only few years</i>	SRM 1: The ability to create long-term relationship with suppliers.	6
<i>Only in a sense that our hospital may save some budgets based on the mutual benefits with the potential suppliers</i>	SRM 2: The ability to maintain the close relationship with suppliers e.g. develop a partnership programme with suppliers for mutual benefits.	8
<i>'but we need to keep it in mind that we still need to prioritise the key suppliers who helps us having the smooth supply chain and increases our customer satisfaction.'</i>	SRM 3: The ability to evaluate the supplier performance against multiple criteria assessments at the strategic, operational and tactical level.	6
<i>'there have been several sources of suppliers and different inventory from individual supplier as well based on the nature of medical tourism supply chain.'</i>	SRM 4: The ability to prioritise the key suppliers to increase the supply chain quality.	8

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

5.5.7 Exploring service performance management performance measurements (SPM)

Service performance management is the ability to manipulate and improve the performance of firm service (Baltacioglu et al., 2007). This process leads attention from every level of firms because of service quality need to be measured between customer satisfaction and service performance after consuming (Boon-itt et al., 2017). Service performance management consists of assessing service performance and customer experience, planning enough service capacity to serve the customer, adjusting the service schedule, and controlling the service quality. These can be developed in order to improve performance and meet customer expectations in medical tourism industry (Baltacioglu et al., 2007; Ellram et al., 2004; Boon-itt et al., 2017; Wang et al., 2015). Measuring the service performance is necessary to ensure that customer or medical tourists would have satisfied experiences. To do so, different measurements were suggested from experts by having in-depth interview and field trip observation. These deep responses from all expert insights engage a better understanding of the service range of medical tourism industry and measurable dimension which would drive the total revenue and customer satisfaction. In addition, author had tried to enrich and interpret data from every response to the proposed measurements as shown in Table 38.

Table 38 Proposed order process management performance measurement for MTSC

First-order codes	Proposed service performance management performance measurement (C6)	Frequency*
<i>‘we raised the important of team management because all stakeholders have seen the opportunities at the same goals within this industry in long term’</i>	SPM 1: The ability to have the team management skill.	14
<i>‘it makes sense to work closely and get win-win benefits both service providers and plus, customers also have more alternatives to choose their preference on service platform as well’</i>	SPM 2: The ability to provide the service flexibility e.g., Service volume, speed, lead time, range of services and specification.	4
<i>No matter how intensive situation happened, we need to fix it as soon as possible. The nature of medical tourism industry is unpredictable so the ability to provide the various service flexibility is strongly required</i>	SPM 3: The ability to administer pre- and post-process service.	2
<i>Regarding to team management, all department needs to know and track other progress, try their best to maintain the standardization in every individual service point.</i>	SPM 4: The ability to have concrete or rubric score for service performance evaluation e.g., Profit margin, labor productivity, customer satisfaction, facilities, average customer spend per time, employee turnover ratio	6
<i>‘Every single department had conducted an exact assessment</i>	SPM 5: The ability to maintain the service standardization	8

<i>from international accredited organization.'</i>		
<i>As consequence, we have been trying to let our potential medical tourists perceive that we have had several international accreditations which met the robust qualifications in quality and safety</i>	SPM 6: The ability to deliver the accurate service to patients.	3

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

The interviews showed that team management skill is considered for the priority. All stakeholders in medical tourism industry need to incorporate the commitment for offering service to individual medical tourist treatment. Often hotels, airlines, are affiliated with Thai hospital is managed by an international chain hotel chain organization. The hotel may initiate the special promotion attaching the medical treatment packages in such case of short- and long-recuperation periods. Similarly, in the early 2000s many travel booking platforms (such as Agoda, Booking, Expedia, TravelPerk, LeMax, TripAdvisor, Airbnb, Kayak, Skyscanner and so forth) have been affiliated as the one-stop service site by offer the discounts if customers make the reservation all-inclusive flight & hotel packages. One of participants identified the opportunities based on the importance of team management skills:

[...] There are scenarios whereby we need to focus on both external and internal team management skills. Anyway, we raised the important of team management because all stakeholders have seen the opportunities at the same goals within this industry in long term. If hospital got the higher number of medical tourists, it would create the huge demand in both flights and hotel reservation as well. We know about this according to historical observations. Almost all medical tourists have their own accompany people, around 2-3 people on average, such as their family, friends, medical facilitator, personal interpreter and so forth. So, it makes sense to work closely and get win-win benefits both service providers and plus, customers also have more alternatives to choose their preference on service platform as well [...]

Moreover, the proposed performance measurement on team management skill also assisted in building connections between customer satisfaction and service standardization. Service standardization in medical tourism industry, ideally, refers to the medical service international standard accreditation. In this study, JCI Accreditation is chosen since the inclusion criteria because it implies as the signal to patient safety and quality of care as standard maintenance. Below is the response of one of hospital directors in this sampling that stated about the link between rubric score for service performance evaluation and international medical service mandatory standardization measurements.

[...] We always take it serious about medical treatment procedures and patient risks. Every single department had conducted an exact assessment from international accredited organization. At first it was quite hard to switch the previous work culture into the global excellent work culture as the standard of international organization. Regarding to team management, all department needs to know and track other progress, try their best to maintain the standardization in every individual service point. As consequence, we have been trying to let our potential medical tourists perceive that we have had several international accreditations which met the robust qualifications in quality and safety. [...]

Providing service flexibility performance measurement is also essential in the context of medical tourism industry. The requested services may vary based on the disability conditions, medical treatment conditions, patient preferences, country of origin and background experience. Besides, service readiness and service flexibility are involved the positive service quality and assisted in forming favorable attitude towards a friendly and mankind service. One of participant explained as follows:

[...] No matter how intensive situation happened, we need to fix it as soon as possible. The nature of medical tourism industry is unpredictable so the ability to provide the various service flexibility is strongly required. Before we start our work every day, we usually keep it in mind and trace service volume with teams on each day, service speed update, lead time and so forth. If the urgent service and special specification came up, we would need to coordinate with our partner within hospital chain. [...]

5.5.8 Exploring information and technology management performance measurements (ITM)

In the literature on information and technology management, there seems to be general agreement that it helps keep up-to-date customer demand, share information, meet expectation, shape the scope of service, manage skilled-labors, and provide performance feedback (Ellram et al., 2004; Boon-itt et al., 2017). Information and technology management supports the effective management, coordination, and collaboration among supply chain to develop service performance and service operations among medical tourism supply chain (Boon-itt et al., 2017; Cho et al., 2012; Chopra & Meindl, 2004). Adopting information technology is also a key enabler to oblige decision making and facilitate necessary information both intra-and inter-organisations (Baltacioglu et al., 2007). In addition, measuring the performance of information and technology management process can help service supply chain in medical tourism industry supporting and achieving the competitive advantage in their firm.

This confirms the findings of several prior research that implementing information & technology management. It has a significant role for Thai medical tourism (Debata et al., 2015; Wang et al., 2012; Fetscherin & Stephano, 2016) regarding to customer relationship management. Almost all participants raised that providing useful and up-to-date information on their platforms or social media as one of the main recommended performance measurements for medical tourism industry. They explained that it could help medical tourists to decide their medical treatment plan and make an appointment for examination. One of participants, head of marketing department, shared her ideas as follows:

[...] Our team as marketers, we need to upload frequently all information about medical treatment plan, pricing, promotion, visa information and everything that potential patients requested. It refers to our ability to offer the target by using the suitable technology platforms such as Facebook Ads, Instagram Ad, Tik Tok clips, affiliated marketing with medical facilitator website, Weibo, and other application. We also offer the channel or useful tip video on YouTube hospital channel to advertise indirectly to the target group about healthy tips by using our additional service. [...]

In addition, one of participants also offered her idea about the ability to adopt the new technology to support firm and customer demand as follows.

[...] We can say that one of our competitive advantage is technology adoption. The focal service here is about delivering the essential service to support internal system to flow all process through customer journey. We always find the new technology to support both medical and non-medical sections. [...]

Surprisingly, in this section especially about technology and information implementing for decision making was rarely mentioned as the main role. Participants gave the rationale behind this point as follows.

[...] We do accept that new software and technology would help us to increase revenue, have constant demand forecast and stable order quantity for procurement. But the result from software cannot strive as the substantial evidence to make decisions, manual or human decision always come first based on authority [...]

As consequence, participant also highlighted that corporate culture is also found as one of the important barriers to adopt technology for decision making. Overall proposition as author is also Thai, corporate culture plays an important role especially hierarchical or seniority-Based Culture. The rapid technology change can be difficult to happened and making decision based on technology is hard to enact until getting the consensus approval from board of administration. All these constructs are explored and proposed to prioritise in medical tourism supply chain based on the research questions and research objectives in this study. Therefore, all these constructs (see Table 39) will be adopted and designed the research strategies and research methods in the next chapter.

Table 39 Proposed order process management performance measurement for MTSC

First-order codes	Proposed information & technology management performance measurement (C7)	Frequency*
<i>‘Our team as marketers, we need to upload frequently all information about medical treatment plan, pricing, promotion, visa information and everything that potential patients requested’</i>	ITM 1: The ability to keep up-to date information for firm’s supply chain.	4
<i>‘It refers to our ability to offer the target by using the suitable technology platforms such as Facebook Ads, Instagram Ad, Tik Tok clips, affiliated marketing with medical facilitator website, Weibo, and other application.’</i>	ITM 2: The ability to adopt the new technology to support firm and customer demand.	7
<i>We can say that one of our competitive advantage is technology adoption.</i>	ITM 3: The ability to access information timely any time by firm technological device and networks.	4
<i>‘The focal service here is about delivering the essential service to support internal system to flow all process through customer journey.’</i>	ITM 4: The ability to create the concrete and effective information network among intra- and inter-firms.	3

<i>We also offer the channel or useful tip video on YouTube hospital channel to advertise indirectly to the target group about healthy tips by using our additional service</i>	ITM 5: The ability to provide useful information on technology platform with customers.	10
<i>We do accept that new software and technology would help us to increase revenue, have constant demand forecast and stable order quantity for procurement.</i>	ITM 6: The ability to provide useful information on technology platform with suppliers.	4
<i>We always find the new technology to support both medical and non-medical sections.</i>	ITM 7: Firm can apply the information and technology for decision making.	2
<i>But the result from software cannot strive as the substantial evidence to make decisions, manual or human decision always come first based on authority</i>	ITM 8: The ability to track the accurate data within medical tourism supply chain.	8

* The number of sub-themes repeated by the participants based on empirical evidence Figure 20

5.6 The refined SSC performance measurements for medical tourism

The main aim of this research is to explore the role of service supply chain performance measurements in the Thai medical tourism industry. All 41 refined SSC performance measurements have been built based on empirical phase one as shown the in Table 40.

Table 40 The proposition of refine SSC performance measurements for medical tourism

MTSC Performance measurements

DM 1	The ability to focus on forecast accuracy on inbound medical tourists.
DM 2	The ability to match patients' requirement with healthcare service provider's capacity.
DM 3	The ability to facilitate the healthcare & tourism information to the patients.
DM 4	The ability to adjust demand & supply capacity at the operations level. e.g., The physicians are allocated to the uncertain amount number of patients.
DM 5	The ability to use up-to-date information for managing and balancing patients' demand among MTSC.
CAP 1	The ability to manage tangible resources allocation.
CAP 2	The ability to manage intangible resources allocation.
CAP 3	The ability to seek for alternative resources or labors in case the shortage happens.
CAP 4	The ability to ensure the service process has sufficient resources and service capacity to operate the fluctuated patients' demand in the most cost-effective manner.
CAP 5	The ability to provide service to customer with least waiting time.
CAP 6	The ability to adjust the service capacity with the optimum point between peak and minimum points of demand.
CRM 1	The ability to focus on individual medical tourists' preferences and satisfaction.
CRM 2	The ability to communicate or advertise information to medical tourist.
CRM 3	The ability to create the effective relationship with customer by brand royalty.
CRM 4	The ability to trace the medical tourists' feedback to improve the medical tourism supply chain.
CRM 5	The ability to maintain relationship with medical tourists after their treatment.
CRM 6	The ability to categorize and prioritise the group of customers.
SRM1	1. The ability to create long-term relationship with suppliers.
SRM2	2. The ability to maintain the close relationship with suppliers e.g. develop a partnership programme with suppliers for mutual benefits.
SRM3	3. The ability to evaluate the supplier performance against multiple criteria assessments at the strategic, operational and tactical level.
SRM4	4. The ability to prioritise the key suppliers to increase the supply chain quality.

Table 41 The proposition of refine SSC performance measurements for medical tourism (Cont)

MTSC Performance measurements (Cont'd)

OPM 1	The ability to process service order entry or translate patient's requirement correctly to the operations team.
OPM 2	The ability to manage the reservation system efficiently through up-to-date technology system.
OPM 3	The ability to interact with patients with courtesy.
OPM 4	The ability to provide treatment service as promised to the right patients, in the right place and at the right time.
OPM 5	The ability to manage the shortest or appropriate waiting time to the patients since placing order entry through reservation system until finishing treatment services.
OPM 6	The ability to have smooth treatment processes and customer journey

SPM 1	The ability to have the team management skill.
SPM 2	The ability to provide the service flexibility e.g., Service volume, speed, lead time, range of services and specification.
SPM 3	The ability to administer pre- and post-process service.
SPM 4	The ability to have concrete or rubric score for service performance evaluation e.g., Profit margin, labor productivity, customer satisfaction, facilities, average customer spend per time, employee turnover ratio
SPM 5	The ability to maintain the service standardization
SPM 6	The ability to deliver the accurate service to patients.

ITM 1	The ability to keep up-to date information for firm's supply chain.
ITM 2	The ability to adopt the new technology to support firm and customer demand.
ITM 3	The ability to access information timely any time by firm technological device and networks.
ITM 4	The ability to create the concrete and effective information network among intra- and inter-firms.
ITM 5	The ability to provide useful information on technology platform with customers.
ITM 6	The ability to provide useful information on technology platform with suppliers.
ITM 7	The ability to apply the information and technology for decision making.
ITM 8	The ability to track the accurate data within medical tourism supply chain.

5.7 Summary of Chapter 5

This chapter is intended to outline the first stage of the empirical phases and its resultant findings. The use of purposive sampling was key in selecting appropriate and accessible research participants for the study. Upon determining suitable candidates, the author proceeded to employ semi-structured interviews as the primary data collection method. The thematic analysis technique was then utilized to produce sub-themes in this phase of the study.

Key findings resulting from the initial empirical study phase are as follows:

- 1) A total of 41 new service supply chain (SSC) performance measurements were identified during the first empirical study phase. These measurements were categorized under seven principal themes: demand management, capacity and resource management, customer relationship management, order process management, supplier relationship management, service performance management, and information & technology management (as detailed in Table 40-41).
- 2) The 41 SSC performance measurements were generated based on the insights of twenty participants from various regions of Thailand. These measurements will then serve as the foundation for the prioritization of influential performance measurements in the second empirical study phase.

Chapter 6

Confirmatory Study: Empirical Phase II and III

6.1 Introduction

This chapter primarily revolves around the evaluation of quantitative surveys carried out in phase one. Its central objective is the prioritization of refined service supply chain (SSC) performance measurements according to their relative significance within the seven service supply chain activities. This phase mainly focuses on ascertaining the relative weight of SSC activities and their corresponding performance measurements within the medical tourism supply chain, leveraging survey responses from Thai medical tourism experts.

The overarching aim of this phase is to formulate strategic and policy recommendations for healthcare service providers within the Thai medical tourism industry. The scope of this study, however, is primarily concentrated on potential medical tourists and healthcare service providers accredited by the Joint Commission International (JCI). Thus, to extrapolate and generalize these findings within the Thai context, further large-scale validations from diverse sources are indispensable.

The rationale underpinning this phase is the identification of the relative importance of each SSC performance measurement tied to primary SSC activities, with the ultimate objective of enhancing service performance. To fulfill this purpose, the second study phase lays emphasis on the Analytic Hierarchy Process (AHP), a quantitative approach. Semi-structured interviews were initially employed during the exploratory study phase (study phase one) to scrutinize the SSC performance measurements, followed by the distribution of AHP-based questionnaires to experts during the subsequent phase.

In alignment with the primary goal of this study—to propose and prioritize SSC performance measurements influencing the overall service performance of JCI-accredited healthcare providers in Thai medical tourism—a conceptual framework and proposed SSC measurements were undertaken in Chapter 3. This was followed by the prioritization of all SSC measurements using the AHP technique in Chapter 5.

Continuing this journey, the present chapter conducts interviews with the same sample of JCI-accredited healthcare providers in Thailand to maintain the consistency of expert judgments. It aims to build on the findings from study phase two by illustrating the interrelationships among the top ten SSC performance measurements using the Interpretive Structural Modelling (ISM)

approach. The outcomes of the ISM method elucidate the explicit interrelationships among SSC performance measurements, thereby assisting practitioners in determining areas of focus and developing potential strategies for future performance improvement.

6.2 Objectives of confirmatory study: Phase II and Phase III

- 1) To critically prioritize and determine the relative importance of the refined SSC performance measurements compared to other influencing factors.
- 2) To evaluate the interrelationships and dependencies among the identified SSC performance measurements.
- 3) To propose practical guidelines and strategies for improving the performance of the medical tourism service supply chain in Thailand.

6.3 Phase II: Quantitative study

In the contemporary healthcare landscape, service providers are placing increased emphasis on Service Supply Chain (SSC) to enhance service performance and customer satisfaction. For team heads and top managers, it is imperative to discern whether SSC components significantly contribute to service improvement. This chapter, therefore, focuses on evaluating the relative weight of proposed service performance measurements (derived from phase one) within the medical tourism industry, drawing on the opinions of industry experts.

The principal objective of this chapter is to critically prioritize these refined SSC performance measurements, determining whether some metrics are more influential than others. To achieve this, author adopted a similar Analytic Hierarchy Process (AHP) as delineated by Roh et al. (2013). This process comprises three fundamental principles: (1) defining the decision problem within a hierarchical structure, (2) conducting pairwise comparisons and determining priorities among the elements in the hierarchy, and (3) synthesizing these judgments (for more detail, refer to Chapter 4: Methodology).

6.3.1 samplings

As the selection of purposive sampling in this study led inconsistency applied for service improvement in medical tourism supply chain, the exploratory study in phase one was first decided to conduct with experts to get essential feedback on each measurement. Hence, this section used

the same 20 key informants of JCI accredited healthcare service providers to participate the panel and make judgements as the group decision-making (See Chapter 5: section 5.5.1). These experts all have been working more than 10 years of their work experience, which support the judgement to be valid and reliable. All participants requested to be conducted the interviews by face-to-face only because they are in the top-level positions and managerial positions, author needed to visit them on-site based on Thai culture and the importance of their seniority.

This section incorporates the 41 refined measurements outlined in Table 42 and employs the Analytic Hierarchy Process (AHP) to discern the weight and importance ranking of each measurement in study phase two. AHP has been selected for its simplicity and the clarity of its results. The integration of thematic analysis and AHP proves beneficial as it enables data triangulation, thereby providing a robust foundation for suggesting critical SSC measurements. These measurements can be used to develop service improvement guidelines for healthcare service providers in Thailand.

Table 42 The description of criteria for MTSC performance measurements

Attribute	Sub-attribute	Description of criteria
Demand Management (C1)	Demand forecasting (DM1)	The ability to focus on forecast accuracy on inbound medical tourists.
	Supply & demand balancing (DM2)	The ability to match patients' requirement with healthcare service provider's capacity.
	Information facilitation (DM3)	The ability to facilitate the healthcare & tourism information to the patients.
	Supply & demand adjustment (DM4)	The ability to adjust demand & supply capacity at the operations level. e.g., The physicians are allocated to the uncertain amount number of patients.
	Usage of up-to-date information (DM5)	The ability to use up-to-date information for managing and balancing patients' demand among MTSC.
Capacity & resource management (C2)	Tangible resource (CP1)	The ability to manage tangible resources allocation.
	Intangible resource (CP2)	The ability to manage intangible resources allocation.

	Alternative resource (CP3)	The ability to seek for alternative resources or labors in case the shortage happens.
	Real-time demand fluctuation (CP4)	The ability to ensure the service process has sufficient resources and service capacity to operate the fluctuated patients' demand in the most cost-effective manner.
	Service readiness (CP5)	The ability to provide service to customer with least waiting time.
	Optimum service capacity (CP6)	The ability to adjust the service capacity with the optimum point between peak and minimum points of demand.
Customer Relationship Management (C3)	Individual preference (CM1)	The ability to focus on individual medical tourists' preferences and satisfaction.
	Advertisement (CM2)	The ability to communicate or advertise information to medical tourist.
	Brand royalty (CM3)	The ability to create the effective relationship with customer by brand royalty.
	Customer feedback (CM4)	The ability to trace the medical tourists' feedback to improve the medical tourism supply chain.
	After service (CM5)	The ability to maintain relationship with medical tourists after their treatment.
	Customer categories (CM6)	The ability to categorize and prioritise the group of customers.
Order process management (C4)	Requirement translation (OP1)	The ability to process service order entry or translate patient's requirement correctly to the operations team.
	Reservation system (OP2)	The ability to manage the reservation system efficiently through up-to-date technology system.
	Courtesy (OP3)	The ability to interact with patients with courtesy.
	Promised medical service (OP4)	The ability to provide treatment service as promised to the right patients, in the right place and at the right time.
	Short process (OP5)	The ability to manage the shortest or appropriate waiting time to the patients since placing order entry through reservation system until finishing treatment services.
	Smooth customer journey (OP6)	The ability to have smooth treatment processes and customer journey
	Supplier relationship (SR1)	The ability to create long-term relationship with suppliers.

Supplier Relationship Management (C5)	Partnership programme (SR2)	The ability to maintain the close relationship with suppliers e.g., develop a partnership programme with suppliers for mutual benefits.
	Supplier performance (SR3)	The ability to evaluate the supplier performance against multiple criteria assessments at the strategic, operational and tactical level.
	Key suppliers (SR4)	The ability to prioritise the key suppliers to increase the supply chain quality.
Service Performance Management (C6)	Team (SP1)	The ability to have the team management skill.
	Flexibility (SP2)	The ability to provide the service flexibility e.g., Service volume, speed, lead time, range of services and specification.
	Pre- & post-service (SP3)	The ability to administer pre- and post-process service.
	Performance evaluation (SP4)	The ability to have concrete or rubric score for service performance evaluation e.g., Profit margin, labor productivity, customer satisfaction, facilities, average customer spend per time, employee turnover ratio
	Standardization (SP5)	The ability to maintain the service standardization
	Accurate service (SP6)	The ability to deliver the accurate service to patients.
Information & Technology Management (C7)	Up-to-date information (IT1)	The ability to keep up-to date information for firm's supply chain.
	New technology (IT2)	The ability to adopt the new technology to support firm and customer demand.
	Device & network (IT3)	The ability to access information timely any time by firm technological device and networks.
	Concrete network (IT4)	The ability to create the concrete and effective information network among intra- and inter-firms.
	Technology platform for customers (IT5)	The ability to provide useful information on technology platform with customers.
	Technology platform for suppliers (IT6)	The ability to provide useful information on technology platform with suppliers.
	Decision making (IT7)	The ability to apply the information and technology for decision making.
	Data tracking (IT8)	The ability to track the accurate data within medical tourism supply chain.

6.3.2 AHP in medical tourism supply chain measurements

In this phase, the methodology employed to prioritize each measurement integrates the Analytic Hierarchy Process (AHP). The AHP model was selected to allocate weights to each SSC measurement and to evaluate the relative importance of these measurements. The primary goal of the AHP model in this context is to identify the most significant performance measurement of the SSC for service improvement evaluation.

The findings from study phase one identified seven main attributes (C1: demand management, C2: capacity & resource management, C3: customer relationship management, C4: order process management, C5: supplier relationship management, C6: service performance management, and C7: Information & technology management), based on existing literature, and these were positioned at the criteria level in the AHP model.

A total of 41 sub-criteria, ranging from DM1 to IT8 (see Table 42), were derived from the exploratory study and are considered at the sub-level. These attributes were used in a pairwise comparison matrix to compute the ranking or degree of importance of each attribute to the SSC within the Medical Tourism Supply Chain (MTSC) using the bipolar AHP survey (see Chapter 4, Appendix 8). In this model, there is no 'alternative' at the bottom level.

The standard scale of 1-9, indicating preference between two parameters, was used for the pairwise comparison. The comparison was guided by the questions and objectives set for this phase of the study.

6.4 Data Analysis

The outcomes of the analysis focusing on the preference sequence of primary SSC activities, along with the defined sub-measurements of each main SSC activity, are presented (refer to Appendices 11-18). Initially, Table 43 displays the results of consistency checks of the primary attribute, intended for ranking and emphasizing the importance of each SSC within the context of MTSC performance enhancement. The consistency ratio (CR) of the pairwise matrix pertaining to all attributes is considered acceptable when it is less than 0.1.

Table 43 The consistency checking of criteria for MTSC performance measurements

Attributes	λ_{max}	CI	RI	CR
(C1) Demand management	5.1025	0.0256	1.12	0.0229
(C2) Capacity and resource management	6.2442	0.0488	1.24	0.0394
(C3) Customer relationship management	6.1645	0.0329	1.24	0.0265
(C4) Order process management	6.3691	0.0738	1.24	0.0595
(C5) Supplier relationship management	4.1172	0.0391	0.90	0.0434
(C6) Service performance management	6.3206	0.0641	1.24	0.0517
(C7) Information and technology management	8.8376	0.1197	1.41	0.849

6.5 Evaluation of main attributes

Table 44 delineates the sequence of importance of the primary attributes. The first crucial activity for consideration within the service supply chain (SSC) performance criteria in the context of medical tourism is 'Customer Relationship Management (C3)', signifying a normalized weight of 0.2796. Following this, 'Order Process Management (C4)' assumes the second position of significance when evaluating service performance, exhibiting a normalized weight of 0.1563.

Table 44 The preference order of the major attributes

Rank	Attribute	Normalized weight	Accumulated weight
1	(C3) Customer Relationship Management	0.2796	0.2796
2	(C4) Order Process Management	0.1563	0.4359
3	(C1) Demand Management	0.1549	0.5908
4	(C7) Information & Technology Management	0.1413	0.7321
5	(C6) Service Performance Management	0.1266	0.8587
6	(C5) Supplier Relationship Management	0.0715	0.9302
7	(C2) Capacity & Resource Management	0.0698	1.0000
Total weight		1.0000	

Collectively, the normalized weight of 'Customer Relationship Management (C3)' and 'Order Process Management (C4)' is 0.4359, indicating that approximately half of the medical tourism service performance measurements are emphasized by healthcare service providers. 'Demand Management (C1)', with a normalized weight of 0.1549, ranks third, raising the cumulative weight to 0.5908, or 59.08%. 'Information & Technology Management (C7)' is fourth in the ranking, with a normalized weight of 0.1413. 'Service Performance Management (C6)' and 'Supplier Relationship Management (C5)' follow, with normalized weights of 0.1266 and 0.0715 respectively. 'Capacity & Resource Management (C2)', with a normalized weight of 0.0698, is regarded by experts from healthcare service providers as the least significant SSC activity in the medical tourism service chain. To sum up, the results reveal that, according to Thai experts from Joint Commission International (JCI) accredited healthcare service providers, 'Customer Relationship Management' is deemed the most critical among the main attributes for service performance evaluation in the medical tourism service chain, while 'Capacity & Resource Management' ranks as the least crucial SSC performance criterion.

6.5.1 Sub-attributes

Following results confirm the overall results of the preference order of importance for each sub-attribute of main SSC activities.

Demand Management

First, according to Table 45 on demand management, findings reveal that ‘supply & demand balancing’ is the most important attribute with a normalized weight of 0.3451 among five attributes. ‘Usage of up-to-date information’ follows with a normalized weight of 0.2026. The first two of the attributes consist of an accumulated weight of 0.5477 (54.77%) among the attributes. ‘Supply and demand adjustment’ ranked in the third of the preference order of demand management with a normalized weight of 0.1826. The last attributes, ‘demand forecasting’ with a normalized weight of 0.1071, considered to be the least important in SSC service performance measurements.

Table 45 The preference order of demand management

Rank	Attribute	Normalized weight	Accumulated weight
1	(DM2) Supply & demand balancing	0.3451	0.3451
2	(DM5) Usage of up-to-date information	0.2026	0.5477
3	(DM4) Supply & demand adjustment	0.1826	0.7303
4	(DM3) Information facilitation	0.1626	0.8929
5	(DM1) Demand forecasting	0.1071	1.0000
Total		1.0000	

Table 45 indicates that 'Supply & Demand Balancing' is perceived as the most crucial factor for service performance evaluation in the context of demand management within the SSC. Conversely, 'Demand Forecasting' ranks as the least significant aspect in this context.

6.5.2 Capacity & resource management

As depicted in Table 46, when considering capacity and resource management, 'Tangible Resources' emerged as the paramount attribute, holding a normalised weight of 0.2540 amongst the six attributes. This was closely followed by 'Service Readiness' with a normalised weight of 0.2126. Notably, these two sub-attributes together contribute to almost 50% of the total weight, underscoring their significance in capacity and resource management within SSC.

The remaining attributes, namely 'Real-time Demand Fluctuation', 'Optimum Service Capacity', and 'Alternative Resources', are ranked lower in terms of normalised weight. The least significant attribute is 'Intangible Resources', which holds a normalised weight of just 0.0605. The striking disparity between 'Tangible Resources' and 'Intangible Resources' is evident, with the former outweighing the latter by more than four times, indicating a greater emphasis on tangible resources in the capacity and resource management within the SSC context.

Table 46 The preference order of capacity & resource management

Rank	Attribute	Normalized weight	Accumulated weight
1	(CP1) Tangible resources	0.2540	0.2540
2	(CP5) Service readiness	0.2126	0.4666
3	(CP4) Real-time demand fluctuation	0.1821	0.6487
4	(CP6) Optimum service capacity	0.1531	0.8018
5	(CP3) Alternative resources	0.1377	0.9395
6	(CP2) Intangible resources	0.0605	1.0000
Total weight		1.0000	

From Table 46, it can be concluded that 'Tangible resource' is most important preference order on capacity & resource management for SSC service performance evaluation. On the other hand, 'intangible resource' got the least importance other factors.

6.5.3 Customer relationship management

Table 47, dedicated to customer relationship management, highlights 'Advertisement' as the leading attribute, holding a normalised weight of 0.3267 among the six attributes. This is followed by 'Brand Loyalty' with a normalized weight of 0.2185. Together, these two sub-attributes account for nearly half of the total weight, underlining their significance in customer relationship management.

Furthermore, the table indicates a lower normalized weight for 'Individual Preference' and 'Customer Feedback', at 0.1594 and 0.1444 respectively. The attribute of least significance is 'After Service', registering a normalized weight of 0.0638. It is noteworthy to observe the pronounced difference between the importance of 'Advertisement' and 'After Service', with the former surpassing the latter by over five times, indicating a larger focus on advertising efforts within the customer relationship management facet of SSC.

Table 47 The preference order of customer relationship management

Rank	Attribute	Normalized weight	Accumulated weight
1	(CM2) Advertisement	0.3267	0.3267
2	(CM3) Brand royalty	0.2185	0.5452
3	(CM1) Individual preference	0.1594	0.7046
4	(CM4) Customer feedback	0.1444	0.8490
5	(CM6) Customer categories	0.0872	0.9362
6	(CM5) After service	0.0638	1.0000
Total weight		1.0000	

Consequently, taking all each listed sub-attribute from Table 47, it can be concluded that 'Advertisement' is most important preference order on customer relationship management for SSC service performance evaluation. On the other hand, 'After service' got the least importance compared to other factors.

6.5.4 Order process management

Table 48, focusing on order process management, indicates that 'Courtesy' is the dominant attribute, possessing a normalized weight of 0.2982 amongst six attributes. This is succeeded by 'Smooth Customer Journey', registering a normalized weight of 0.2102. These two attributes together account for more than half of the total weight, signifying their crucial role in order process management.

Furthermore, 'Short Process' and 'Promised Medical Service' exhibit similar levels of importance in order process management, with normalized weights of 0.1764 and 0.1753 respectively. Meanwhile, 'Requirement Translation', with a normalized weight of 0.0560, is considered the least significant attribute within the realm of order process management.

Consequently, by examining each sub-attribute from Table 48, it can be inferred that 'Courtesy' holds the greatest importance within the framework of order process management for SSC service performance evaluation, whereas 'Requirement Translation' is deemed least significant relative to the other factors.

Table 48 The preference order of order process management

Rank	Attribute	Normalized weight	Accumulated weight
1	(OP3) Courtesy	0.2982	0.2982
2	(OP6) Smooth customer journey	0.2102	0.5084
3	(OP5) Short process	0.1764	0.6848
4	(OP4) Promised medical service	0.1753	0.8601
5	(OP2) Reservation system	0.0839	0.9440
6	(OP1) Requirement translation	0.0560	1.0000
Total weight		1.0000	

6.5.5 Supplier relationship management

According to Table 49, which examines supplier relationship management, the attribute 'Key Supplier' stands out as the most significant, boasting a normalized weight of 0.4270 among four attributes. This is followed by 'Supplier Relationship' with a normalized weight of 0.2142. Evidently, 'Key Supplier' holds substantial weight, accounting for almost 50% of the total.

The other attributes, namely 'Supplier Relationship Management', 'Partnership Programme', and 'Supplier Performance', hold less weight with normalized values of 0.2142, 0.1908, and 0.1680 respectively. This signals their relative importance in the preference order on supplier relationship management.

Table 49 The preference order of supplier relationship management

Rank	Attribute	Normalized weight	Accumulated weight
1	(SR4) Key suppliers	0.4270	0.4270
2	(SR1) Supplier relationship	0.2142	0.6412
3	(SR2) Partnership programme	0.1908	0.8320
4	(SR3) Supplier performance	0.1680	1.0000
Total weight		1.0000	

From Table 49, it can be concluded that 'Key supplier is considered to be most important preference order on supplier relationship management for SSC service performance evaluation. On the other hand, 'supplier performance' got the least importance other factors.

6.5.6 Service performance management

Based on the data from Table 50, which examines service performance management, the 'Team' attribute emerges as the most crucial, with a normalized weight of 0.2779 among six attributes. This is followed by 'Accurate Service' with a normalized weight of 0.2162. These top two attributes collectively constitute nearly half of the total weight.

Further down the preference order of service performance management are 'Standardization' and 'Flexibility', with normalized weights of 0.1841 and 0.1672 respectively. 'Performance Evaluation' comes next, with a normalized weight of 0.0895. The attribute of 'Pre- & Post-Service', with a normalized weight of 0.0651, is considered the least significant in SSC service performance measurements.

In conclusion, looking at all sub-attributes listed in Table 50, 'Team' stands out as the most critical factor in service performance management for SSC service performance evaluation. In contrast, 'Requirement Translation' holds the least significance compared to the other sub-attributes.

Table 50 The preference order of service performance management

Rank	Attribute	Normalized weight	Accumulated weight
1	(SP1) Team	0.2779	0.2779
2	(SP6) Accurate service	0.2162	0.4941
3	(SP5) Standardization	0.1841	0.6782
4	(SP2) Flexibility	0.1672	0.8454
5	(SP4) Performance evaluation	0.0895	0.9349
6	(SP3) Pre- & post- service	0.0651	1.0000
Total weight		1.0000	

6.5.7 Information & Technology Management

In terms of Information & Technology Management, as depicted in Table 51, 'Up-to-date Information' is recognized as the most critical attribute, holding a normalized weight of 0.1974 among eight attributes. This accounts for nearly one-fifth of the total weight, underscoring its significance.

The next in line is 'Decision Making' with a normalized weight of 0.2142. A close look at other sub-attributes like 'Decision Making', 'Technology Platform for Customers', 'Technology Platform for Suppliers', reveals minor differences in their normalized weights, clocking in at 0.1406, 0.1377, and 0.1292 respectively. The two least important attributes in SSC service performance measurements are 'New Technology' and 'Device & Network', with normalized weights of 0.0887 and 0.0779 respectively.

In conclusion, the data from Table 47 highlights 'Up-to-date Information' as the most critical factor in Information & Technology Management for SSC service performance evaluation. Conversely, 'Device & Network' is deemed the least significant among other factors.

Table 51 The preference order of information & technology management

Rank	Attribute	Normalized weight	Accumulated weight
1	(IT1) Up-to-date information	0.1974	0.1974
2	(IT7) Decision making	0.1406	0.3380
3	(IT5) Technology platform for customers	0.1377	0.4757
4	(IT6) Technology platform for suppliers	0.1292	0.6049
5	(IT8) Data tracking	0.1150	0.7199
6	(IT4) Concrete network	0.1135	0.8334
7	(IT2) New technology	0.0887	0.9221
8	(IT3) Device & network	0.0779	1.0000
Total weight		1.0000	

6.5.8 Final weight

The ultimate weights for all individual attributes were calculated to reveal their ranking preferences, as depicted in Table 52. Among these, 'Advertisement' has the highest weight at 0.0914, thus making it the most influential attribute in the evaluation of SSC performance for MTSC measurements. Notably, nearly half of the total influence on SSC performance evaluation, specifically 49.56% or 0.4956, is accounted for by the top 11 attributes.

In these top 11 attributes, 'Advertisement', 'Brand Royalty', 'Individual Preference', and 'Customer Feedback' (ranked 1st, 2nd, 5th, 6th, respectively) all belong to the 'Customer Relationship Management' category. Interestingly, these four attributes align well with and corroborate the superior significance of 'Customer Relationship Management' (C3) among the primary SSC attributes.

Table 52 The overall result of the final weights of the sub-attribute

Rank	Code	Attributes	Final weight	Accumulated weight
1	CM1	Advertisement	0.0914	0.0914
2	CM2	Brand royalty	0.0611	0.1524
3	DM2	Supply & demand balancing	0.0535	0.2059
4	OP3	Courtesy	0.0466	0.2525
5	CM1	Individual preference	0.0446	0.2971
6	CM4	Customer feedback	0.0404	0.3374
7	SP1	Team	0.0352	0.3726
8	OP6	Smooth customer journey	0.0328	0.4055
9	DM5	Usage of up-to-date information	0.0314	0.4368
10	SR4	Key suppliers	0.0305	0.4674
11	DM4	Supply & demand adjustment	0.0283	0.4956
12	IT1	Up-to-date information	0.0279	0.5235
13	OP5	Short process	0.0276	0.5511
14	OP4	Promised medical service	0.0274	0.5785
15	SP6	Accurate service	0.0274	0.6059
16	DM3	Information facilitation	0.0252	0.6310
17	CM6	Customer categories	0.0244	0.6554
18	SP5	Standardization	0.0233	0.6787
19	SP2	Flexibility	0.0212	0.6999
20	IT5	Technology platform for customers	0.0199	0.7198
21	IT7	Decision making	0.0195	0.7392
22	IT6	Technology platform for suppliers	0.0183	0.7575
23	CM5	After service	0.0178	0.7753
24	CP1	Tangible resource	0.0177	0.7931
25	DM1	Demand forecasting	0.0166	0.8097
26	IT3	Device & Network	0.0163	0.8259
27	IT8	Data tracking	0.0160	0.8420
28	SR1	Supplier relationship	0.0153	0.8573

29	CP5	Service readiness	0.0148	0.8721
30	SR2	Partnership programme	0.0136	0.8858
31	OP2	Reservation system	0.0131	0.8989
32	CP4	Real-time demand fluctuation	0.0127	0.9116
33	IT2	New Technology	0.0125	0.9241
34	SR3	Supplier performance	0.0120	0.9361
35	SP4	Performance evaluation	0.0113	0.9475
36	IT4	Concrete network	0.0110	0.9585
37	CP6	Optimum service capacity	0.0107	0.9692
38	CP3	Alternative resource	0.0096	0.9788
39	OP1	Requirement translation	0.0088	0.9875
40	SP3	Pre- & Post-service	0.0082	0.9958
41	CP2	Intangible resource	0.0042	1.0000
Total weight			1.0000	

6.6 Phase III: Interpretive Structural Modelling (ISM) and MICMAC

Interpretive Structural Modelling (ISM) was originally developed by Warfield (1974). ISM has been widely adopted in medical tourism perspective by several researchers like Ahani et al. (2021), Debata et al. (2013), Ajmera and Jain (2019b), Ho et al. (2015), S. Kim, Arcodia, and Kim (2019), T. H. Cham et al. (2021), Zolfagharian, Rajamma, Naderi, and Torkzadeh (2018), Sadeh and Garkaz (2019). Extensive literature review conducted about the factor for decision making, customer intention, motivation factor from customer side. Therefore, in this study there is still a gap to analyse the interrelationship through the supply side from JCI healthcare service provider. ISM technique was chosen to help author comprehend the relationship between various service performance measurements in the clear and well-organized model (Debata et al., 2013).

6.6.1 Identification of performance measurements of service supply chain for Thai medical tourism

Building on the AHP results from the previous chapter, which identified SSC measurements and established their relative weight priorities, the Interpretive Structural Modelling (ISM) can be used to further analyse the interrelationships among the proposed SSC measurements. This will assist policy makers and top-level managers in healthcare service providers to better understand and prioritize their focus. Therefore, to spotlight the most influential performance measurements, the author decided to apply the Pareto principle (also known as the 80/20 rule) to the 41 refined SSC performance measurements.

The Pareto principle, proposed by Pareto in 1964, posits that 80% of the output is generated by 20% of the input, suggesting that a minority of inputs can produce the majority of the results. By applying this principle, 20% of the total SSC performance measurements were selected, rounding up to 10 measurements to facilitate easy assessment of interrelationships.

As a result, 10 SSC performance measurements were extracted based on their final weight from the AHP results, with consultation from Thai practitioners in JCI accredited healthcare service providers. These measurements are listed in Table 53. For clarity, a brief description of these measurements is provided, ensuring clear understanding of each performance measurement before assigning symbols in the ISM steps.

Table 53 The 10 refined performance measurements from AHP

Rank	Ranked Measurements	Description of SSC performance measurements
1	‘Advertisement’	The ability to communicate or advertise information to medical tourist.
2	‘Brand royalty’	The ability to create the effective relationship with customer by brand royalty.
3	‘Supply & demand balancing’	The ability to match patients’ requirement with healthcare service provider’s capacity.
4	‘Courtesy’	The ability to interact with patients with courtesy.
5	‘Individual preference’	The ability to focus on individual medical tourists’ preferences and satisfaction.
6	‘Customer feedback’	The ability to trace the medical tourists’ feedback to improve the medical tourism supply chain.
7	‘Team management’	The ability to have the team management skill.
8	‘Smooth customer journey’	The ability to have smooth treatment processes and customer journey
9	‘Usage of up-to-date information’	The ability to use up-to-date information for managing and balancing patients’ demand among MTSC
10	‘Key supplier’s prioritisation’	The ability to prioritise the key suppliers to increase the supply chain quality.

6.7 Data Analysis and discussion: ISM approach analysis

After getting the top ten ranking service performance measurements from AHP result, then A total of 20 practitioners as the same group since Chapter 3 and 5 were consulted for developing contextual relationship.

6.7.1 Structural self-interaction matrix (SSIM)

There are four symbols were denoted each direction and V, A, X, O allocated in SSIM to explicit the relationship (Raj, 2015; Warfield, 1974). The description of each symbol is explained in Table 50. Based on the opinion of practitioners, then Structural self-interaction matrix (SSIM) was developed (see Table 54).

Table 54 Symbols relationship in ISM

Symbol	Explanation
V	i influences j
A	J would be influenced by i
X	Both I and j will not influence each other
O	There is no relationship between both variables

Source: Adopted from (Ajmera & Jain, 2019a; Taneja & Sushil, 2007)

V, A, X, O in SSIM (Table 54.) would explain the meaning of the use of these symbols:

- PM 3 can influence PM 8. This means that PM namely ‘Supply and demand balancing’ may influence PM ‘Smooth customer journey’. Therefore, the relationship between PM3 and PM8 is symbolized by ‘V’ in SSIM.
- PM 8 can be influenced by PM 9, i.e., PM 8 namely, ‘Smooth customer journey’ would influence PM 9 ‘Usage of up-to-date information’. Thus, the relationship between PM 8 and PM 9 is denoted by ‘A’ in SSIM.
- PM 4 and PM 6 influence each other. PM 9, namely ‘Courtesy’ and PM 6 namely, ‘Customer feedback, influence each other. Therefore, the relationship between this relationship is signified by ‘X’ in SSIM.
- There is no relationship between PM 3 ‘Supply & demand balancing’ and PM 7 ‘team management’. Then this relationship is denoted by ‘O’ in the SSIM.

Table 55 Structural self-interaction matrix

SSC performance measurements (PM)	1	2	3	4	5	6	7	8	9	10
1. Advertisement		O	A	X	V	A	A	A	A	V
2. Brand royalty			V	V	V	V	O	O	A	V
3. Supply and Demand balancing				V	V	V	O	V	A	V
4. Courtesy					V	X	A	A	A	V
5. Individual preference						O	A	A	O	A
6. Customer feedback							A	A	A	V
7. Team management								A	A	V
8. Smooth customer journey									A	V
9. Usage of up-to-date information										V
10. Key supplier prioritization										

The SSIM is created by getting the answer ‘Yes’ and ‘No’ from the question of: ‘will PM A_i influence PM A_j ’? If the answer is yes, then $C_{ij} = 1$. If the answer is no, then $C_{ij} = 0$. SSIM was described as the below matrix. PM_{ij} means the elements. The C_{ij} indicates the relationship between the PM_i and PM_j elements. B is an SSIM.

$$B = \begin{matrix} & PM_1 & PM_2 & \dots & PM_n \\ \begin{matrix} PM_1 \\ PM_2 \\ \vdots \\ PM_n \end{matrix} & \left| \begin{array}{cccc} 0 & C_{12} & \dots & C_{1n} \\ C_{21} & 0 & \dots & C_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ C_{n1} & C_{n2} & & 0 \end{array} \right| \end{matrix}$$

6.7.2 Reachability matrix

SSIM is transformed into the initial reachability matrix (RM) which depicted the relationship between the variables in (0,1) binary form by converting V, A, X, O by 1 and 0 each variable. The substitution of 0 and 1 are explained as the following criteria below (see Table 56 and Table 57) (Huang, Tzeng, & Ong, 2005; Warfield, 1974).

Table 56 The criteria for reachability matrix development

Symbols in SSIM	Binary digit in Reachability matrix
V to the cell C_{ij}	If the cell C_{ij} entry 'V', then C_{ij} converts to 1 and C_{ji} substitutes 0
A to the cell C_{ij}	If the cell C_{ij} entry 'A', then C_{ij} converts to 0 and C_{ji} substitutes 1
X to the cell C_{ij}	If the cell C_{ij} entry 'X', then both C_{ij} and C_{ji} convert to 1.
O to the cell C_{ij}	If the cell C_{ij} entry 'O', then both C_{ij} and C_{ji} convert to 0.

Table 57 Initial reachability matrix (RM)

SSC performance measurements (PM)	1	2	3	4	5	6	7	8	9	10
1. Advertisement	0	0	1	1	0	0	0	0	1	1
2. Brand royalty	0	1	1	1	1	1	0	0	0	1
3. Supply and Demand balancing	1	0	1	1	1	1	0	1	0	1
4. Courtesy	1	0	0	1	1	1	0	0	0	1
5. Individual preference	0	0	0	0	1	0	0	0	0	0
6. Customer feedback	1	0	0	1	0	1	0	0	0	1
7. Team management	1	0	0	1	1	1	1	0	0	1
8. Smooth customer journey	1	0	0	1	1	1	1	1	0	1
9. Usage of up-to-date information	1	1	1	1	0	1	1	1	1	1
10. Key supplier prioritization	0	0	0	0	1	0	0	0	0	1

Next, transitivity is introduced to scrutinize when reached the step of final reachability matrix development. Transitivity refers to the relationship among three variables in such a way that a relationship is found between A and B, and between B and C, then the relationship between A and C also does exist (Sushil, 2018). The final reachability matrix is acquired by substituting transitivity, which is signified as 1*. Noted that the final reachability matrix needs to cross-check once when it was found at least any column or row has all 1 or 0. It would affect the dependent and driving elements depicted the interconnected relationship in the digraph. After cross-check the transitivity from the initial reachability matrix, Table 58 below shows the final reachability matrix with its transitivity, dependence for each performance measurement, and driving power.

Table 58 Final reachability matrix

PM	1	2	3	4	5	6	7	8	9	10	Driving Power
1	1	0	0	1	1	1*	0	0	0	1	5
2	1*	1	1	1	1	1	1*	1*	0	1	9
3	1	0	1	1	1	1	1*	1	0	1	8
4	1	0	0	1	1	1	0	0	0	1	5
5	0	0	0	0	1	0	0	0	0	0	1
6	1	0	0	1	1*	1	0	0	0	1	5
7	1	0	0	1	1	1	1	0	0	1	6
8	1	0	0	1	1	1	1	1	0	1	7
9	1	1	1	1	1*	1	1	1	1	1	10
10	0	0	0	0	1	0	0	0	0	1	2
Dependence Power	8	2	3	8	10	8	5	4	1	9	58/58

Note: 1* transitivity

6.7.3 Level partitioning

The level partitions are created by the reachability matrix. All partitions are derived to present the hierarchy of all elements (Debata et al., 2013). Warfield (1974) suggested that the reachability set and the antecedent set for each variable can get from the final reachability matrix. The reachability set refers to the series of PM (i) itself and other elements which are reachable from the PM(i). Each column which contains 1 in the row of considered element, PM(i) that column is counted as the reachability set. In addition, each row which consists of 1 in the column of considered element, PM(i) in that row is taken as in the antecedent set. Then, the intersection set for both reachability and antecedent sets are extracted for all elements and divided into the established levels. For example, the reachability set of the first SSC performance measurement ‘Advertisement’ is the set of PMs (1) row counted 1 in the first row (1,4,6) and first column (1, 2, 3, 4, 6, 7, 8, 9). Then, the intersection of these sets is derived for all PM (1) to PM (10). The same process would keep the repetitive process until the level of each performance measurement is found.

In case of the top priority is obtained then the considered variable would be eliminated from the iteration process. Iteration would be done when author completed the level classification process. This process leads to the final iteration to the lowest level of ISM hierarchy. In this section, the 10 performance measurements with their reachability set, antecedent set and intersection set are given in Table 59-67.

Table 59 Level partitioning: first iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
1	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	
3	1, 3, 4, 5, 6, 7, 8, 10	2, 3, 9	3	
4	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	
5	5	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	5	I
6	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	
7	1, 4, 5, 6, 7, 10	2, 3, 7, 8, 9	7	
8	1, 4, 5, 6, 7, 8, 10	2, 3, 8, 9	8	
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	
10	5, 10	1, 2, 3, 4, 6, 7, 8, 9, 10	10	

Table 60 Level partitioning: Second iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
1	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	II
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	
3	1, 3, 4, 5, 6, 7, 8, 10	2, 3, 9	3	
4	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	
6	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	
7	1, 4, 5, 6, 7, 10	2, 3, 7, 8, 9	7	
8	1, 4, 5, 6, 7, 8, 10	2, 3, 8, 9	8	
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	
10	5, 10	1, 2, 3, 4, 6, 7, 8, 9, 10	10	

Table 61 Level partitioning: third iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
1	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	III
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	
3	1, 3, 4, 5, 6, 7, 8, 10	2, 3, 9	3	
4	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	III
6	1, 4, 5, 6, 10	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	
7	1, 4, 5, 6, 7, 10	2, 3, 7, 8, 9	7	
8	1, 4, 5, 6, 7, 8, 10	2, 3, 8, 9	8	III
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	

Table 62 Level partitioning: Fourth iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	IV
3	1, 3, 4, 5, 6, 7, 8, 10	2, 3, 9	3	
7	1, 4, 5, 6, 7, 10	2, 3, 7, 8, 9	7	
8	1, 4, 5, 6, 7, 8, 10	2, 3, 8, 9	8	
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	

Table 63 Level partitioning: fifth iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	V
3	1, 3, 4, 5, 6, 7, 8, 10	2, 3, 9	3	
8	1, 4, 5, 6, 7, 8, 10	2, 3, 8, 9	8	
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	

Table 64 Level partitioning: sixth iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	VI
3	1, 3, 4, 5, 6, 7, 8, 10	2, 3, 9	3	
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	

Table 65 Level partitioning: seventh iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
2	1, 2, 3, 4, 5, 6, 7, 8, 10	2, 9	2	VII
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	

Table 66 Level partitioning: seventh iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
9	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	9	9	VIII

Table 67 Level partitioning: level of SSC performance measurements iteration

PM(i)	Reachability Set	Antecedent Set	Intersection Set	Level
1	1, 4, 6	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	III
2	2	2, 9	2	VII
3	3	2, 3, 9	3	VI
4	1, 4, 6	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	III
5	5,	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	5	I
6	1, 4, 6	1, 2, 3, 4, 6, 7, 8, 9	1, 4, 6	III
7	7	2, 3, 7, 8, 9	7	IV
8	8	2, 3, 8, 9	8	V
9	9	9	9	VIII
10	10	1, 2, 3, 4, 6, 7, 8, 9, 10	10	II

6.7.4 Building digraph for ISM model development

The digraph ISM model used the identified level partitioning with the final reachability matrix to draw the graph. Khurana, Mishra, Jain, and Singh (2010) suggested that digraph was the combination between the directional graph and hierarchical level representing the graphical demonstration and relationship among elements. Table 68 shows the obtained lower triangular matrix after iteration and initial digraph is established through the canonical form of reachability matrix. Then, all transmittivities are removed before finalising the digraph.

Table 68 Lower triangular matrix for building digraph (with transitivity)

PM	5	10	1	4	6	7	8	3	2	9	Driving Power	Level
5	1	0	0	0	0	0	0	0	0	0	1	I
10	1	1	0	0	0	0	0	0	0	0	2	II
1	1	1	1	1	1*	0	0	0	0	0	5	III
4	1	1	1	1	1	0	0	0	0	0	5	III
6	1*	1	1	1	1	0	0	0	0	0	5	III
7	1	1	1	1	1	1	0	0	0	0	6	IV
8	1	1	1	1	1	1	1	0	0	0	7	V
3	1	1	1	1	1	1*	1	1	0	0	8	VI
2	1	1	1*	1	1	1*	1*	1	1	0	9	VII
9	1*	1	1	1	1	1	1	1	1	1	10	VIII
Dependence Power	10	9	8	8	8	5	4	3	2	1		
Level	I	II	III	III	III	IV	V	VI	VII	VIII		

Table 69 Lower triangular matrix for building digraph (without transitivity)

PM	5	10	1	4	6	7	8	3	2	9	Driving Power	Level
5	1	0	0	0	0	0	0	0	0	0	1	I
10	1	1	0	0	0	0	0	0	0	0	2	II
1	1	1	1	1	1	0	0	0	0	0	5	III
4	1	1	1	1	1	0	0	0	0	0	5	III
6	1	1	1	1	1	0	0	0	0	0	5	III
7	1	1	1	1	1	1	0	0	0	0	6	IV
8	1	1	1	1	1	1	1	0	0	0	7	V
3	1	1	1	1	1	1	1	1	0	0	8	VI
2	1	1	1	1	1	1	1	1	1	0	9	VII
9	1	1	1	1	1	1	1	1	1	1	10	VIII
Dependence	10	9	8	8	8	5	4	3	2	1		
Power												
Level	I	II	III	III	III	IV	V	VI	VII	VIII		

The links between the PMs are illustrated with its arrows to show the direction of each PM.(i). The digraph ISM model for SSC performance measurements demonstrates in Figure 22 below showing that ‘PM 9: Usage of up-to-date information’ is at the bottom implying that PM 9 can influence the ‘PM 2 brand royalty’ directly, whereas it cannot be influenced by other PMs. It can be concluded that ‘PM 9 Usage of up-to-date information’ is a pertinent performance measurement at the beginning. This finding is also consistent with the previous study of Debata et al. (2013) that ‘usage of up-to date information’ performance measurement will play the significant role for service improvement. The next level performance measurement is ‘PM2 brand royalty’. PM2 can be influenced by PM 9 Usage of up-to-date information. The third level is ‘PM3 Supply

and Demand balancing’. PM3 can be influenced by the previous discussed PMs and in the same way it affects ‘PM8 Smooth customer journey’ directly. The fourth level is ‘PM8 Smooth customer journey’. Afterward, ‘PM7 Team management’ is the hub of the system which connected with the rest of next level of PMs, and it can be influenced by previous discussed PMs. Hence, it can be inferred that ‘PM7 Team management’ is an imperative performance measurement which is strongly required the engagement from every section in healthcare service provider in medical tourism industry. The next level consists of three PMs namely: ‘PM1 Advertisement, PM4 Courtesy, and PM6 Customer feedback’. These three PMs can be influenced by ‘PM7 team management’ and it may impact ‘PM10 key supplier prioritisation’. Finally, the top-level PMs are responsive to be influenced and managed by other PMs which is ‘PM5 individual preference’.

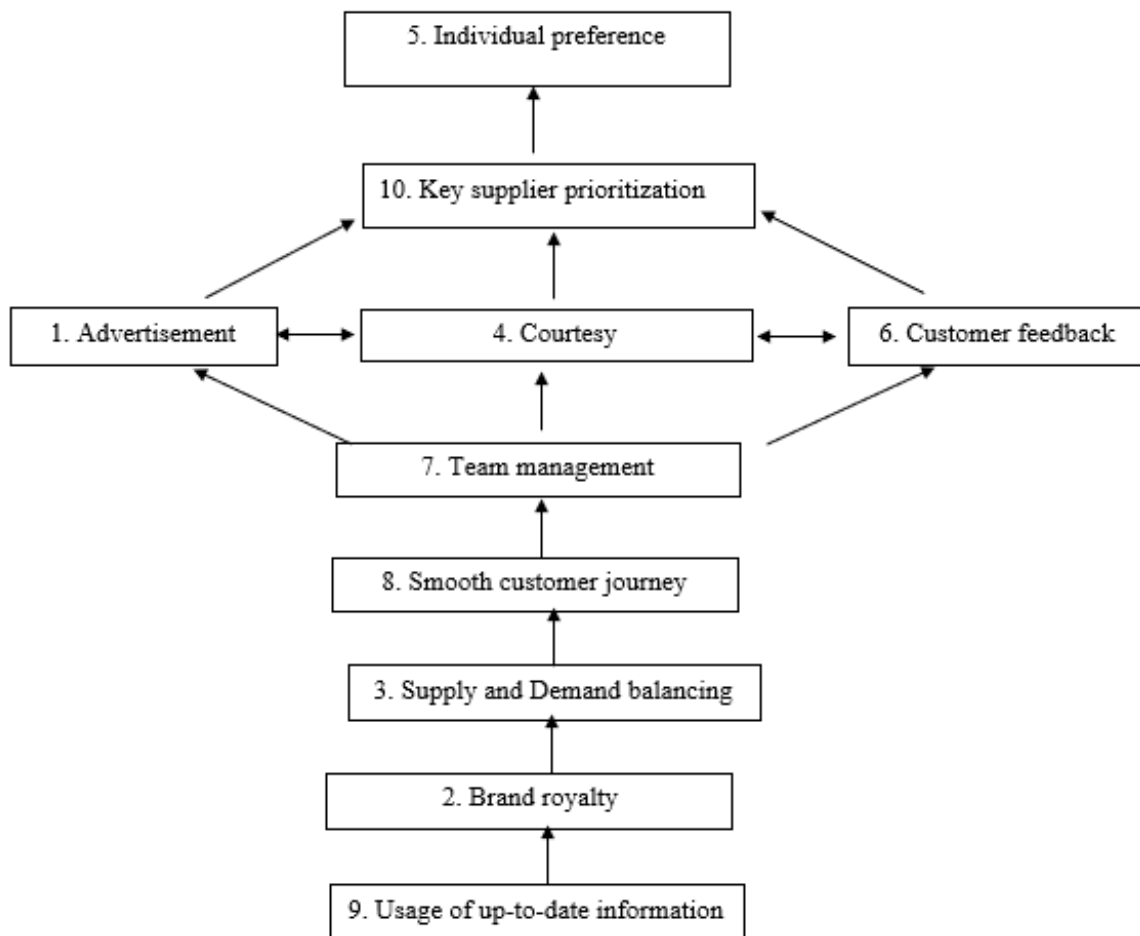


Figure 22 Diagram ISM model of SSC performance measurements in medical tourism

Before moving on to the MICMAC analysis, this study follows the correctness checking process based on Sushil (2018) study which are explained as follows:

- verify the elements: *'Check if all elements are included and verify through empirical stage'*

This step needs to check that targeted elements are all included to analyse. In this study, author selected top ten proposed performance measurements from the empirical results in chapter 5 and conducted the primary data from the same group to maintain the consistency. Noted that, all proposed service performance measurements may not generalise beyond the data settings due to the limited data accessibility and permission for data collection on-site during COVID-19 pandemic. Then, author also checked contextual relationship to ensure findings interpretation with experts' judgement from both academic and practitioners.

- reachability matrix: *'check the bias and unbiased judgements and the appropriate the allocated binary digit (0,1) in reachability matrix'*

Sushil (2018) claimed that some bias/unbiased relationships by getting too many 'Yes' or 'No' from experts may impact the result of flat structure and some elements affecting each other would allocate in the same level. Therefore, the clear judgements for interpretation were required in reachability matrix. In this study, author solely visited all targeted participants on-site, then all results were cross-check and finalise to ensure the aggregated matrix.

- *check the transitivity*

In this study, author re-examined transitivity whether at least a column has all 1 or 0 value because it may affect the diagraph development stage. After that, author checked the partitioning development such as reachability set, antecedent set, and intersection set.

- check digraph and final model

Author re-checked for the distinctive links which would have 1 in respective cell and the transitivity link examined once for any distinctive interpretation for the clear logic of knowledge.

6.7.5 Data Analysis and discussion: integration of ISM and MICMAC approach analysis

The main aim of MICMAC analysis is to assess the driving power and dependence power of PMs in this study. All performance measurements from ISM result are classified into four clusters (Debata et al., 2013). The finding in this study is also parallel with Debata et al. (2013) which provides the greater consideration to the potential elements or variables impacting the overall medical tourism. Ajmera and Jain (2019b) also studied and showed the results about barrier in healthcare industry using ISM and MICMAC. Hence, the primary study objective in this chapter is to investigate the interrelationship among SSC performance measurements for Thai medical tourism. Therefore, a comprehend model (see Figure 28) had been established so that healthcare service providers and policies makers may understand and get prepared for the direction of service improvement within their organization. The practitioners in healthcare service providers can obtain the information and use this model to understand the relative importance among performance relationship.

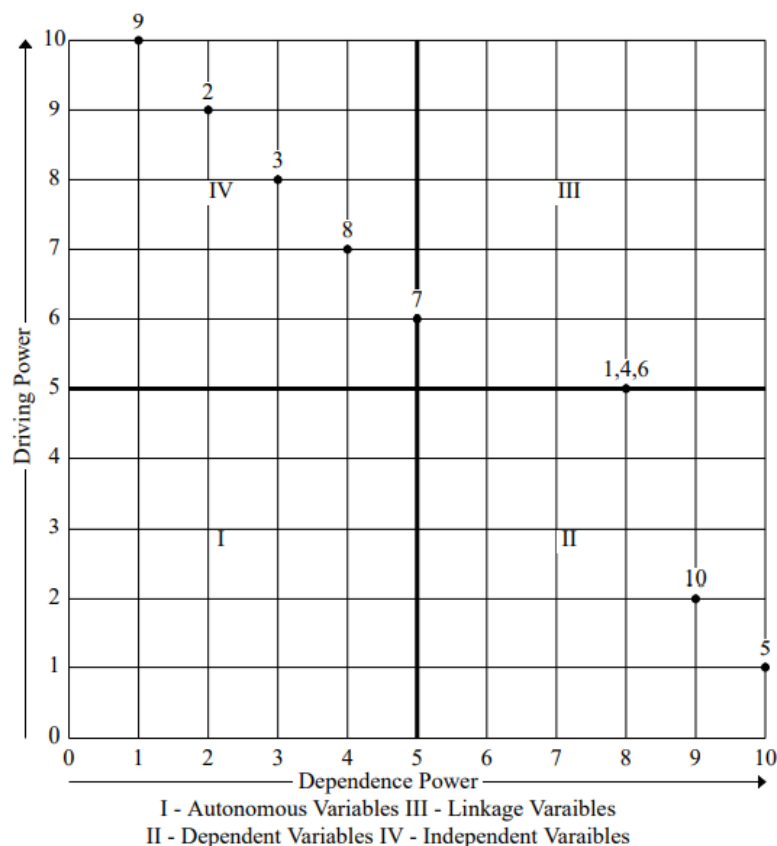


Figure 28: The four clusters of all performance measurement directly affect the service improvement of medical tourism industry

6.7.6 Autonomous variables

Autonomous variable is depicted in the first quadrant. The variable in this quadrant do not have much influence and have weak in both dependence power and driving power. As a result, in this study, there are no autonomous variable.

6.7.7 Dependent variables

In this study, the second quadrant has two variables which have weak driving power but strong dependence on other variables. These variables assign to the top of ISM model including ‘PM5 Individual preference and PM10 Key supplier’s prioritisation’ under dependent category.

According to the rapid changes in customer behaviour, ‘Individual preference’ is imperative to adapt the service capacity matching with the medical tourists’ preferences (Chee, 2007). Customer expectation in medical tourism is about the accurate medical treatment with tourism benefits during recuperation period (Connell, 2013). Consequently, the ability to respond and deliver service to patients and their accompany has the great impact overall service performance.

Additionally, the ability to prioritise the key suppliers is essential to increase the supply chain quality and customer satisfaction (Boon-itt & Pongpanarat, 2011; Boon-Itt et al., 2017). Then, practitioners and policy makers may put the greater consideration to these variables.

6.7.8 Linkage variables

Linkage variables are in the third quadrant and have both strong dependence power and driving power. There are four linkage variables in this category namely, ‘PM1 Advertisement, PM4 Courtesy, PM6 Customer feedback and PM7 team management’.

One of the key performance measurements is the ability to communicate and have interactions with inpatients, outpatients, and potential medical tourists. ‘PM1 Advertisement’ is a very effective and efficient tool to reach the target segmentations which influencing the customer satisfaction (T. H. Cham et al., 2021; J. S. Kim et al., 2021; Z. Liu et al., 2022). For example, the process of Integrated marketing integration (IMC) has been widely adopted to meet the customers or patient’s expectation such as word-of-mouth (T. H. Cham et al., 2021), testimonial (Hallem & Barth, 2011), and other marketing strategies.

In addition, Thailand is actively promoting medical tourism industry and serving patients with courtesy and hospitality service may impact the potential of brand image and brand royalty

(Wongkit & McKercher, 2013). Author strongly understands that ‘PM4 courtesy’ and hospitality service may be difficult to establish the suitable measures for every department, then some healthcare service providers would count the claims and customer feedback as the measure of courtesy. The pattern of service also improves the overall courtesy and hospitality service such as the staffs were allocated every assembly point, escalators and in front of each department to deliver the smooth customer’s journey to their patients.

As from the AHP results, one of the top ten performance measurements affecting the service improvement and adjusting the resource capacities is the ability to turn the customer feedback into the constructive problem-solving and useful guidelines. ‘PM6 Customer feedback’ may help healthcare service provider to understand in detail about market segmentation, attractive promotions, and new targeted groups penetration (T. H. Cham, Y. M. Lim, & M. Sigala, 2021; Momeni et al., 2018).

Additionally, ‘PM7 Team management’ represents the hub of the system in this study. It is in the midst to connect the top-level variable and other variables at the same level. Such a result, all these four variables are not stable because any circumstance on these variables will have impacts on other variables.

6.7.9 Independent variables

In this study, four variables fall into the independent category which have strong driving power but weak dependence power. Bottom level of SSC performance measurements such as ‘PM2 Brand loyalty, PM3 Supply & demand balancing, PM8 Smooth customer journey and PM9 Usage of up-to-date information’. These are the very pertinent variables and strongly need maximum attention.

According to the exploratory study results in Chapter 3 and 5, brand loyalty performance measurement refers to the ability to create the effective relationship with customer by brand royalty management (T. H. Cham et al., 2021; Fetscherin & Stephano, 2016). Heung et al. (2010) identified that brand and hospital chain may be the great choice for medical tourist decisions. In this study, testimonial (Hallem & Barth, 2011) has significant role as the brand royalty. So, the ability to improve the brand loyalty through marketing strategies in healthcare service provider is notable for potential medical tourists’ decisions (Wongkit & McKercher, 2013).

One of the high important performance measurements in Thai medical tourism industry is about the ability to balance their demand or patients’ requirement and supply or service capacity. Demand

may imply the incoming requirement and predictable patients' intentions, while supply refers to the capability of healthcare service providers to prepare their own medical service delivery and coordinate with subordinate non-medical service providers.

The ability to deliver the smooth treatment process and customer journey is also important. Generally, patients or customers expected to have the convenient services and clear direction since the starting point until the end of the process (Boon-Itt et al., 2017). This is the reason that top-level positions and policy makers need to pay attention and provide close engagement to maintain the standard of service quality under the framework of JCI international accreditation.

'PM9 Usage of up-to-date information' may help in facilitating the real time and useful information to all variables. PM9 refers to the ability to use up-to-date information for managing and balancing patients' demand among supply chain. Therefore, this variable can drive the flow of service process, supply chain and order process management. Even though these four variables have strong drive power but weak dependence power. These may imply as the root cause of all variables.

However, practitioners should focus the top priority performance measurements which may affect the income, customer satisfaction and overall service improvement. All these variables need to understand more in-depth about interrelationship among variables and design the relevant performance measurement which should be appropriate within their front-line work, measurable and justice performance measurements, and motivated all practitioner raise awareness about service improvement.

6.8 Summary of Chapter 6

This study comprises two empirical phases for confirmatory analysis: phase two and phase three. Phase two focuses on the prioritisation of established SSC performance measurements within the medical tourism industry. It evaluated SSC activities as drivers and appraised proposed measurements from the first phase of the study, all within the medical tourism supply chain context. To determine the relative importance of each proposed SSC measurement, the Analytical Hierarchy Process (AHP) was deployed. The subsequent group decision-making analysis unveiled that, for healthcare service providers, Customer Relationship and Order Process Management emerge as key considerations for measuring service performance.

In more detail, the AHP analysis pinpointed 'Advertisement' from the Customer Relationship Management dimension as the most significant preference order. It is followed closely by 'Brand Royalty' and 'Demand and Supply Balancing' from the Demand Management dimension. The phase concludes with 'Capacity & Resource Management' ranking lowest among the SSC main attribute dimensions.

Phase three of the study employed Interpretive Structural Modelling (ISM) to decipher the interrelationships among the top 10 SSC performance measurements in medical tourism. By clarifying these relationships, the ISM model mitigates the limitations of the AHP method employed in phase two. Findings from the ISM analysis emphasise that the most crucial performance measurement is the delivery of services based on individual preferences (PM5).

This finding underscores the importance for healthcare service providers to stay alert to dynamic changes in medical tourist preferences and to understand potential patient behaviour and motivations. Intriguingly, even though 'individual preference' (PM5) does not rank in the same position as 'advertisement' (PM1) in phase two, the importance of communication with medical tourists through advertising, influencing overall service improvement within organizations, remains consistent. Additionally, the findings emphasise the need for close collaboration with Thai practitioners to achieve effective service performance evaluation in terms of service supply chain management.

This not only pertains to internal service improvement but also impacts the enhancement of the Thai medical tourism industry's brand image for long-term service performance assessment guidelines set by policymakers, such as the Ministry of Tourism authority and the Government. A proactive strategic plan may amplify the industry's readiness to accommodate the potential influx of international medical tourists. The following chapter will amalgamate the key points of these findings and conclude the study.

Chapter 7 Discussion

7.1 Overview

The discussion section forms a critical segment of a research paper where the study's results are examined, implications are elaborated upon, and potential limitations are acknowledged. The purpose of this section is to offer justifiable conclusions based on the empirical evidence gathered from Phases One to Three of this study. Herein, author explains into the primary outcomes identified across these phases.

7.2 Discussion of study Phase I

7.2.1 Proposed demand management performance measurements (DM)

This study underscores the significant role that effective demand management plays in maintaining optimal service levels within the medical tourism supply chain. In line with existing literature, it emphasizes the need to manage uncertainty in demand patterns through accurate demand information for capacity planning (Ahani et al., 2021; KURÇER & CİVELEK, 2022; W. Liu et al., 2019; Scott E. Sampson & Money, 2015; Vij, Ryan, Sampson, & Harris, 2020). In practical terms, understanding healthcare demand and patient preferences allows healthcare providers to manage resources more effectively and tailor services to meet patient needs.

The medical tourism industry represents a fusion of healthcare and tourism industries, and it is crucial for both to work in parallel and collaborate throughout the chain. Operating in isolation could limit revenue generation and survival opportunities in a dynamic market. This is particularly important given the current backdrop of the COVID-19 pandemic, which has highlighted the need for industries to maintain current information to better anticipate future steps or manage demand uncertainty.

Almost all study participants emphasized the need for effective demand management skills, leading to the identification of five sub-themes or performance measurements. Despite the wide range of treatment services available in Thailand, medical tourists generally base their treatment choices on tourist attraction locations and specific medical expertise. Thus, assessing the performance of demand management poses a significant challenge to the medical tourism industry.

The study proposes five performance measurements for demand management:

1. The ability to accurately forecast the influx of medical tourists.

2. The ability to align patients' requirements with the capacity of healthcare service providers.
3. The ability to efficiently deliver healthcare and tourism information to patients.
4. The ability to adjust demand and supply capacity at an operational level, for instance, allocating physicians to an uncertain number of patients.
5. The ability to utilize up-to-date information for managing and balancing patient demand across the Medical Tourism Supply Chain (MTSC).

Participants also highlighted the need to adjust demand and supply capacities at an operational level within healthcare service providers. For instance, during the high season in Phuket, physicians or therapists might have to cater to an uncertain number of patients. Therefore, building robust networks among hospital chains to facilitate the exchange or allocation of human resources is seen as a key performance measurement in demand management.

It is further complicated by the fact that some healthcare providers target different groups of medical tourists based on their marketing strategies and geographical areas.

The fluctuation in the number of inbound medical tourists and the fact that medical facilitators may not be based in Thailand, also present a challenge. Therefore, the ability to use up-to-date information for balancing demand is critical.

In conclusion, the consistency and frequency of these insights from in-depth interviews substantiate the proposed performance measurements, highlighting the significance of demand management within the medical tourism supply chain.

7.2.2 Proposed capacity & resource management performance measurements (CAP)

The findings of the study emphasize the importance of effective capacity and resource management in balancing demand and supply within the constraints of facilities and operations. This supports previous research (Cho et al., 2012; Fetscherin & Stephano, 2016; Giannakis, 2011; Selviaridis & Norrman, 2014) that highlights the significance of schedule management in the service industry for capacity utilization, customer satisfaction, and supplier performance.

To measure the performance of capacity and resource management in the medical tourism industry, resource utilization is a key criterion. It assesses how efficiently tangible and intangible resources are managed to deliver services. Capacity and resource management involves the

competence to manage, plan, and allocate both tangible and intangible resources. In the context of the medical tourism supply chain, this includes activities such as resource allocation, utilization, and schedule management.

There are six performance measurements identified for capacity and resource management in this industry:

1. The ability to manage tangible resources allocation.
2. The ability to manage intangible resources allocation.
3. The ability to seek alternative resources or labour in case of shortages.
4. The ability to ensure sufficient resources and service capacity to operate effectively in response to fluctuating patient demand.
5. The ability to provide services to customers with minimal waiting time.
6. The ability to adjust service capacity optimally between peak and minimum demand points.

Effective capacity and resource management in the medical tourism industry involves the challenge of balancing demand and firm capacity within constraints, facilities, and operational limitations. The skill of schedule management is crucial for the service supply chain and has significant impacts on capacity utilization, customer satisfaction, and supplier performance. Additionally, scheduling plays a vital role in labour allocation (Kumar, Sahoo, Lim, Kraus, & Bamel, 2022; K.-N. Liu & Hu, 2022; Mehrparvar et al., 2014).

The participants in the study recognized that the identified performance measurements required effective capacity and resource management skills. Alternative resource management skills, particularly during high seasons, were considered essential by most participants in the medical tourism industry.

Furthermore, some participants suggested that the proposed performance measurements could include waiting time management skills. It is important to note that waiting time and lead time are distinct terms in this industry. Lead time refers to the total time from the starting point until the end of the service chain, while waiting time specifically refers to the duration between when medical tourists arrive at the service point and the start of the process to obtain their medical services. Overall, the study highlights the significance of capacity and resource management in the

medical tourism industry and emphasizes the need for effective skills in areas such as resource allocation, scheduling, and managing fluctuations in demand.

7.2.3 Proposed customer relationship management performance measurements (CRM)

This results aligns with existing literature such as Maestrini et al. (2017), Ahani et al. (2021); Chubing Zhang et al. (2020) studies emphasizing the importance of understanding patients' demands and maintaining close relationships for smooth operations.

Customer relationship management involves the ability to communicate effectively between firms and customers (Olya & Al-ansi, 2018). It includes creating and managing medical tourists' demand and facilitating the utilization of tangible and intangible resources within healthcare service providers. Understanding patients' individual preferences and maintaining close relationships are essential for seamless operations and improving service firm performance.

The proposed performance measurements in customer relationship management, as mentioned by almost all respondents, include:

1. The ability to focus on individual medical tourists' preferences and satisfaction.
2. The ability to communicate or advertise useful information to medical tourists.
3. The ability to establish an effective relationship with customers through brand loyalty.
4. The ability to track and utilize medical tourists' feedback to improve the medical tourism supply chain.
5. The ability to maintain relationships with medical tourists even after their treatment.
6. The ability to categorize and prioritize different customer groups.

The findings also support previous studies by Ahani et al. (2021), Baashar et al. (2020), Guerola-Navarro et al. (2021), and K.-N. Liu and Hu (2022) which highlight the importance of brand loyalty in customer relationship management. Brand loyalty, although subjective, influences customers' positive value perception.

Additionally, interviews with experts in Khon Kaen province emphasize that medical tourists' individual preferences play a significant role in their decision-making process. While medical safety and price are primary factors, medical tourists also consider indirect intentions, such

as pre- and post-recuperation services, nearby tourist attractions for their companions (e.g., family), and luxurious services like airport pick-up and limousine services to the hospital.

Overall, effective communication, brand loyalty, and catering to individual preferences are crucial performance measurements in customer relationship management within the medical tourism industry. Understanding and meeting the needs and expectations of medical tourists contribute to improved customer satisfaction and long-term relationships.

7.2.4 Proposed order process management performance measurements (OPM)

The study reveals that offering services with courtesy is seen as a competitive advantage in the Thai medical tourism industry. This finding is consistent with earlier research that emphasizes the importance of a smooth customer journey in enhancing patient satisfaction (Saccani et al., 2007; Selviaridis & Norrman, 2014; Soltani, Zareie, Milani, & Navimipour, 2018; Somabutr et al., 2022).

Based on this, the study proposes six performance measurements for order process management:

1. The ability to process service order entry accurately and translate patient requirements correctly to the operations team.
2. The ability to efficiently manage the reservation system using up-to-date technology.
3. The ability to interact with patients with courtesy.
4. The ability to deliver treatment services as promised to the right patients, in the right place, and at the right time.
5. The ability to manage the shortest or appropriate waiting time for patients from order entry through the reservation system until the completion of treatment services.
6. The ability to ensure smooth treatment processes and a positive customer journey.

It is the initial step for any firm and can occur through various channels such as on-site at healthcare service providers, online reservations through websites, or hospital applications. This process is vital for capturing medical tourists' orders and specifications, converting every detail into useful information, and passing it through the operations department.

Effective order process management helps reduce service order lead time, manage service cycle time, and streamline customer service order paths. The finding that offering services with courtesy is a substantial competitive advantage in Thai medical tourism aligns with prior research. Participants in the study highly recommended the inclusion of kindness, hospitality, and luxurious

services with courtesy as essential performance measurements. They believed that these factors could motivate medical tourists to provide positive and valuable feedback.

The study also highlights that some participants did not differentiate between order process management and service performance. They tended to assess performance in a holistic manner, considering all concepts together. However, unexpected issues sometimes arise, leading to a bumpy process and confusion for patients. This reinforces the need for a performance measurement related to the ability to offer smooth treatment processes and ensure a positive customer journey.

Overall, the proposed performance measurements for order process management focus on accuracy, efficiency, customer interaction, timely service delivery, waiting time management, and overall customer journey. These measurements aim to enhance the customer experience, satisfaction, and loyalty in the medical tourism industry.

7.2.5 Proposed supplier relationship management performance measurements (SRM)

In accordance with the objectives of this study, the focus is on service supply chain management based on the mechanism of the medical tourism supply chain. Various experts suggested proposing the performance measurements from a general perspective in in-depth interviews. This is due to the fact that performance measurements in manufacturing and services cannot be implemented in the same manner. Therefore, the four proposed performance measurements in the theme of supplier relationship management would be implemented in the general area of the medical tourism supply chain.

Four performance measures are proposed for supplier relationship management:

1. The ability to build long-term relationships with suppliers.
2. The ability to maintain close relationships with suppliers, such as developing partnership programs for mutual benefits.
3. The ability to assess supplier performance against multiple criteria at strategic, operational, and tactical levels.
4. The ability to prioritize key suppliers to enhance the quality of the supply chain.

Supplier relationship management, which is about effectively managing, developing, and sustaining relationships with suppliers (Maestrini et al., 2017; Maestrini et al., 2018), plays a crucial role in the functioning of a firm. It forms the backbone of planning, sourcing, and managing resources before they are handed off to the operational process. This process is inherently related

to capacity and resource management as well as order process management (Baltacioglu et al., 2007).

To deliver consistent service and prevent failures, maintaining service-level agreements and cultivating good relationships with suppliers are crucial (Maestrini et al., 2018; Chun Zhang et al., 2011). The improvement of supplier relationship management performance in healthcare service providers necessitates building strong relationships with suppliers and sharing vital information among them. Moreover, coordinating service development, sourcing, and planning throughout the firm's supply chain is essential (Chopra & Meindl, 2004). Notably, establishing sustainable and reliable relationships with suppliers in the medical tourism supply chain can help circumvent potential service delivery failures (Cho et al., 2012).

However, maintaining close relationships with suppliers does not always directly yield the desired gains for an organization. Thus, the ability to prioritize key suppliers to enhance the quality of the medical tourism supply chain remains an essential skill.

7.2.6 Proposed service performance management performance measurements (SPM)

Service performance management, the process of optimizing and enhancing a firm's services (Baltacioglu et al., 2007), is a key consideration at all levels of a company due to the need for measuring service quality against customer satisfaction post-consumption (Boon-itt et al., 2017). The facets of service performance management include evaluation of service performance and customer experiences, planning sufficient service capacity, adjusting service schedules, and controlling service quality. Developing these aspects can improve performance and meet customer expectations in the medical tourism industry (Baltacioglu et al., 2007; Ellram et al., 2004; Boon-itt et al., 2017; Wang et al., 2015).

Measuring service performance is crucial to ensure that customers or medical tourists have satisfactory experiences. To this end, various metrics have been suggested by experts through in-depth interviews and field observations. These comprehensive responses provide a better understanding of the scope of services in the medical tourism industry and dimensions that can be measured, which could drive overall revenue and customer satisfaction. One significant finding from the interviews is the importance of team management skills. All stakeholders in the medical tourism industry need to demonstrate a commitment to providing individualized treatment for medical tourists. Often, arrangements involving hotels and airlines affiliated with Thai hospitals, managed by international chain hotel organizations, are common. They may offer special

promotions tied to medical treatment packages for both short and long recuperation periods. In a similar vein, numerous travels booking platforms (like Agoda, Booking, Expedia, TravelPerk, LeMax, TripAdvisor, Airbnb, Kayak, Skyscanner, etc.) have emerged as one-stop service sites, offering discounts for all-inclusive flight and hotel packages.

This discussion proposes six service performance measurements:

1. The ability to display team management skills.
2. The ability to provide flexible services, e.g., in terms of volume, speed, lead time, range of services, and specifications.
3. The ability to manage pre- and post-process services.
4. The ability to establish solid or rubric scores for service performance evaluation, e.g., profit margin, labour productivity, customer satisfaction, facilities, average customer spend per visit, employee turnover ratio.
5. The ability to maintain service standardization.
6. The ability to deliver precise services to patients.

The proposed performance measurement focusing on team management skills also helps build connections between customer satisfaction and service standardization. In the context of the medical tourism industry, service standardization ideally refers to adherence to international medical service standards. In this study, JCI Accreditation is chosen as an inclusion criterion, as it signifies patient safety and quality of care.

Service flexibility is also vital in the context of the medical tourism industry. Services may need to vary based on factors like disability conditions, medical treatment needs, patient preferences, country of origin, and prior experience. Furthermore, service readiness and flexibility contribute to positive service quality, fostering a favourable attitude towards friendly and compassionate service.

7.2.7 Proposed information & technology management performance measurements (ITM)

This research reiterates the significant role of information and technology management in enabling effective decision-making and fostering intra- and inter-organizational information sharing. These insights mirror findings from earlier studies such as Ellram et al. (2004) and Boonitt et al. (2017).

While this study confirms numerous aspects of prior research, it also brings fresh perspectives to the understanding of the medical tourism industry, particularly in the context of performance measurement. Notably, this research enhances the grasp of demand management in healthcare, emphasizing the necessity for comprehensive statistical data to forecast healthcare demand with higher accuracy.

Various prior studies, including Debata et al. (2015), Wang et al. (2012), and Fetscherin & Stephano (2016), have substantiated the criticality of effective information and technology management in the Thai medical tourism sector. A core component of this is customer relationship management, an aspect which was identified by the majority of study participants as vital for gauging industry performance.

Participants underscored the importance of proactively distributing pertinent and timely information across multiple platforms, including social media. They contended that such actions empower medical tourists to make well-informed decisions about their treatment plans and facilitate a more efficient appointment scheduling process.

The study suggests eight key performance indicators for information and technology management within the medical tourism industry:

1. The ability to keep up-to date information for firm's supply chain.
2. The ability to adopt the new technology to support firm and customer demand.
3. The ability to access information timely any time by firm technological device and networks.
4. The ability to create the concrete and effective information network among intra- and inter-firms.
5. The ability to provide useful information on technology platform with customers.
6. The ability to provide useful information on technology platform with suppliers.
7. Firm can apply the information and technology for decision making.
8. The ability to track the accurate data within medical tourism supply chain.

Interestingly, one participant emphasized the critical importance of adopting new technology to meet both firm and customer demands. However, it is noteworthy that the role of technology and information in decision-making wasn't frequently identified as essential. As per the participants, cultural factors within corporate settings largely explain this trend. The study

highlights corporate culture as a key obstacle to technology adoption. This barrier is especially prominent in Thailand, where hierarchical or seniority-based cultures may hinder swift adoption of innovative technologies. In such contexts, enacting decisions based on technology may be challenging without obtaining approval from senior executives or the board. This validates the importance of prioritizing these factors in medical tourism supply chains. It also expands comprehension of the impediments and enablers of technology and information management in the medical tourism sector, specifically within the cultural context of Thailand.

This study, while providing significant insights, has its limitations. The data were primarily sourced from industry participants and experts, potentially introducing bias. Future research could employ a more diversified data collection approach, including patient perspectives, to offer a comprehensive understanding of performance measurement in the medical tourism industry.

The context-specific nature of this study, focusing on the Thai medical tourism industry, also limits its generalizability. However, it opens avenues for comparative studies in other countries or regions.

To sum up, study phase one underscored the interplay of various factors that contribute to performance measurements in the medical tourism industry. It emphasized the need for effective demand management, resource management, customer and supplier relationship management, order process management, and information and technology management. The insights drawn offer significant practical implications for service providers in the medical tourism industry, while also identifying potential areas for future research.

7.3 Discussion of study Phase II

Study phase two aims to critically prioritise whether some of those refined SSC performance measurements are more influential than other factors ranked based on Thai medical tourism practitioners. Each main attribute contains the sub-attributes which influence the service performance improvement guideline. To enhance the quality of this chapter, this section presented and discussed the relevant data to the sub-attributes that were finalised (see Table 52) by aligning from the most important to the least important ranking.

However, these findings are limited in scope due to the specific data collection period and the range of participants interviewed. The study was carried out during the first COVID-19 lockdown in 2020, a time when on-site data collection was rendered impossible. Therefore, the importance and ranking of SSC measurements could change within pre- and post-COVID-19

contexts, implying the necessity of updating measurements in accordance with a post-COVID-19 timeframe.

7.3.1 Customer relationship management (CRM)

Customer relationship management (CRM) as a main attribute in SSC dimension was ranked first for medical tourism practitioners, with a normalised weight of 0.2796. The empirical result was consistent with the existing literature review. Guerola-Navarro, Gil-Gomez, Oltra-Badenes, and Sendra-García (2021) suggested that CRM is imperative to manage the better communication for organizations with technological solutions. Baashar et al. (2020) also highlighted about the importance of CRM in healthcare environment which would help decision makers able to support medical and non-medical information to patients and learn about patients' results tracking. Additionally, Talón-Ballester, González-Serrano, Soguero-Ruiz, Muñoz-Romero, and Rojo-Álvarez (2018) if CRM is all about customer satisfaction as the business success of organization. The CRM performance measurements also referred to the constancy of empirical results in study phase one. In this empirical result phase two, the 4 of 6 sub-attributes, which lead the importance of CRM in the top ten priority list namely advertisement (CM2), brand royalty (CM3), individual preference (CM1) and customer feedback (CM4).

Advertisement (CM2) was given the highest important preference order in customer relationship management dimension. Author proposed that advertisement (CM2) performance measurement is about the ability to communicate and advertise information to medical tourist. Advertisement refers to the medical tourists' preferences and their attitude about patient's expectation (T. J. Lee et al., 2020). Cham et al. (2021) claimed that advertisement is one of the most influential to customer decisions in advance based on the brand image of healthcare service providers. To date, there are many marketing distributions channels to communication with potential medical tourists such as word-of-mouth, testimonial from influencers, social media, medical facilitators, and so forth. The result in this study may confirm as the same as Han and Hyun (2015) research, which claimed that word-of-mouth is still powerful and efficient way to attract potential medical tourists in particular from family and friends. Almost all participants in this study also confirmed the upholding empirical finding in this study, however, although word-of-mouth is the traditional communication, it is still widely used and effective in medical tourism industry (Taheri, Chalmers, Wilson, & Arshed, 2021). Word-of mouth through social media is obtaining attention from medical tourists and marketers such as Weibo platform is the powerful tool to

penetrate Chinese targeted group, Tik-Tok application portrays about beauty treatments and surgeries per se. As a result, advertisement is a driver of performance measurement in CRM of SSC dimensions.

In addition, brand royalty (CM3) had the second ranking of preference orders in customer relationship management. Author proposed that brand royalty (CM3) performance measurement in this study is the ability to create the effective relationship with customer by brand royalty. Before healthcare service providers may have the strong brand royalty, it needs to start from obtaining customer feedback and medical & non-medical perceived services reviews. It is apparent that there have been several ranges of medical treatment and services in medical tourism industry, individual medical tourist preference (CM1) performance measurement, refers to the ability to focus on individual medical tourists' preferences and satisfaction, is one of top ten priority of the final weight. Customer feedback (CM4) was provided as the ability to trace the medical tourists feedback to improve the medical tourism supply chain. After service (CM5) measurement referred to the ability to maintain relationship with medical tourists after their treatment.

Almost all healthcare service providers have been managing several years to respond the dynamic changes of individual preference. For example, some hospital provides the facilities for patients based on their culture, religion, leisure lifestyle, room type for accompany and family, activities to do during recuperation period and per se. So, Customer feedback (CM4) can help service provider understand more about market segmentation, attractive promotions, and new targeted groups penetration (T. H. Cham, Y. M. Lim, & M. Sigala, 2021; Momeni et al., 2018). Thus, Brand royalty is also associated with customer feedback (CM4) and after service (CM5) performance measurements.

Proposition one: customer relationship management in this empirical study has an important role to help Thai practitioners from JCI healthcare service providers have shed the lights on performance measurement to have a better understanding of the medical tourists behaviour, study about the influential factors that drive success and customer satisfaction, and competitive advantage, and opportunities and challenges (Guerola-Navarro et al., 2021; Pizam, Shapoval, & Ellis, 2016; Anthony Woodhead, 2013). Thai practitioners should maintain its customer relationship management strategy, which supports and strengthens their competitive advantage to bridge the medical tourist's trend and current facilities and service improvement.

7.3.2 Order Process Management (OPM)

Order Process Management (OPM) was ranked as the second preference order in SSC dimension, with normalised weight of 0.1563. The empirical result was consistent with the existing literature review. The latter practitioners actively showed that the starting point of every service process was established in order process management dimension. This study result is consistent with Palang and Tippayawong (2019) study in the same direction, in which order process management was maximized as the top rank of tourism supply chain dimensions. In terms of hospitality sector, Cho et al. (2012) suggested that OPM is the about the initiation of service reservation or admission to the organization and maintaining service as long as the guest stays. Additionally, Chung-Herrera (2007) provided that order process management is about the capability of focusing the customer expectation during the service process with customers.

Order process management dimension in medical tourism begins with the initiation of patient's appointment from reservation system through patient's admission. The core function of order process management is to translate medical tourist preferences or patients' requirements through the service process correctly and to make the smoothest customer journey if the patients are maintained. The OPM performance measurements also referred to the constancy of empirical results in study phase one. There are six performance measurements within OPM dimension, which were rearranged with the high to low normalised weights such as Courtesy (OP3), Smooth customer journey (OP6), Short process (OP5), Promised medical service (OP4), Reservation system (OP2) and Requirement translation (OP1).

Courtesy (OP3) was given the highest important preference order in order process management dimension. Author proposed that courtesy (OP3) performance measurement is about the ability to interact with medical tourist with courtesy and Thai hospitality and manner. Courtesy is one of the extra uniqueness of Thai medical tourism services. It represents the strength of Thai cultures which attracts potential medical tourists who seek for the premium services with affordable price (Debata et al., 2013; H. Y. Wang, 2012). Thus, courtesy is one of driving performance measurements that pushes Thai medical tourism as the targeted destination for medical tourists.

Almost all medical tourists may design the travel plans for obtaining medical treatments and tourism benefits after that, therefore, healthcare service providers would support medical tourists by offering the short process with the flattest patient's journey. Author then proposed two

measurements which involved patient's plan with smooth customer journey (OP6) and short process (OP5) measurements. Short process in this dimension refers to the ability to manage the shortest or appropriate waiting time to the patients since placing order entry through reservation system until finishing treatment services. Additionally, smooth customer journey means patient would be managed to align with the important point of service stations through hospital process.

The three remaining performance measurements in OPM are Promised medical service (OP4), Reservation system (OP2), and Requirement translation (OP1). Promised medical services (OP4) was represented as the ability to provide treatment service as promised to the right patients, in the right place and at the right time. Reservation system (OP2) means the ability to manage the reservation system efficiently through up-to-date technology system. In medical tourism, the responsive interaction with medical tourists is crucial to attract them because they have high expectations about short waiting time and prompt medical consultation before travelling. Moreover, requirement translation defined as the ability to process service order entry or translate patient's requirement correctly to the operations team. There are several departments in hospital which staffs need to manage both medical and non-medical coordination, so the front-line service staffs need to be prompt and understand patient's requirement through the relevant departments to help patient or medical tourists get the smooth customer journey and have the short waiting time.

Proposition two: Consequently, this activity has a great impact on medical tourist's perception of healthcare service delivery and satisfaction. Failures in this dimension may have a direct negative impact on the overall effectiveness of the service performance. The guidelines for order process management improvement, staffs may need to follow up from medical and non-medical teams and simultaneously report the progress status to medical tourists, which will enhance their satisfactions and increase efficiency its service process.

7.3.3 Demand Management (DM)

Demand management was ranked as the third preference order in SSC dimension, with a normalised weight of 0.1549. There are five performance measurements in demand management dimension which consist of Supply & demand balancing (DM2), Usage of up-to-date information (DM5), Supply & demand adjustment (DM4), Information facilitation (DM3) and Demand forecasting (DM1).

Supply & demand balancing (DM2) was maximized as the top rank of demand management in SSC dimension. Supply and demand balancing was defined as the ability to match patients' requirement with healthcare service provider's capacity. The empirical result is constant with de Vries and Huijsman (2011) about demand and supply matching in healthcare supply chain. Handfield and Bechtel (2002) also highlighted that the importance of responsive demand in supply chain. In medical tourism context, it needs to balance the customer demand with the optimum quantity of human resources and medical services capacity for long-term cost consideration and supplier relationship maintenance. Supply & demand balancing (DM2) measurement is strongly associated with Usage of up-to-date information (DM5) and Supply & demand adjustment (DM4) measurements. Author defined Up-to-date information as the ability to use up-to-date information for managing and balancing patients' demand among MTSC. And the ability to adjust demand & supply capacity at the operations level. e.g., the physicians are allocated to the uncertain amount number of patients was proposed for the Supply & demand adjustment (DM4) measurement. As seen, these three measurements need to work together to flatten the service process for healthcare staffs and providing the efficient and short process to patients. The study result is related to Cho et al. (2012) research which highlighted that information technology is the primary enabler to help managers make decisions and span useful information throughout the entire companies. Likewise, Liang (2015) also provided with empirical results that information not only help its manufacturing outcomes, but also improve the financial objectives and track customer feedback and satisfaction. Another important performance measurement is Demand forecasting (DM1). Author defined Demand forecasting (DM1) as the ability to focus on forecast accuracy on inbound medical tourists. Boon-Itt et al. (2017) suggested that demand management is defined as the ability to use the information to manipulate demand plans. Palang and Tippayawong (2019) also determined that the forecast accuracy supports the successful demand management by using the different forecasting method to manage customer requirement and unpredictable number of upcoming customers. Otherwise, in this study shows that Thai practitioners recognised demand forecast as the least important preference order in demand management dimension. The rationale is about the unpredictable demand problem. They believed that there is no perfect plan for demand forecast. Therefore, the important weight of demand forecasting ranks 5 in this dimension.

Proposition three: It is impossible to get the exact number of medical tourists, Thai practitioners prioritised higher importance weight of supply chain balancing (DM2), rather than demand forecasting (DM1). All issues and problems in medical tourism are probably about the front-line

problem solving which needs critical thinking and decision-making skills. The only thing that they can do is about well preparation for prompt services when medical tourists would arrive at service points, which requires the strong collaboration from staffs and other stakeholders nearby hospital.

7.3.4 Information & Technology Management (ITM)

Information & Technology Management was ranked as the fourth preference order in SSC dimension, with a normalised weight of 0.1413. There were eight performance measurements proposed in Information & technology management dimension, which derived and arranged based on the normalised weights including Up-to-date information (IT1), Decision making (IT7), Technology platform for customers (IT5), Technology platform for suppliers (IT6), Data tracking (IT8), Concrete network (IT4), New technology (IT2), and Device & network (IT3), respectively.

Even though information technology is important through medical tourism supply chain, practitioners still ranked it as the middle important weight. It is because many practitioners stated that they are focusing on mainly about the front-line service delivery, which is perishable and heterogeneous and almost all medical tourists are not willing to wait for the long period to check their information. The self-administered software and concrete network about data system does not guarantee the courtesy and customer satisfactions in some case. The latter practitioners in this study highlighted that information technology was connected as the chain for the whole process. It is crucial to be simultaneously update the information about the medical records and medical preferences through the system to reduce the uncertainty of shortage service capacities.

The empirical result showed that up-to-date information (IT1) was maximized the preference order with a normalised weight 0.1974. Author proposed the up-to-date performance measurement was about the ability to keep up-to-date information for firm's supply chain. The empirical result is linked with Boon-Itt et al. (2017) in the same direction, in which also ascertained the comprehensive list of measurements about service supply chain process relating to Decision making (IT7), Technology platform for customers (IT5), Technology platform for suppliers (IT6), and Data tracking (IT8). Kerr, Norris, and Stockdale (2007) reflected that the useful information implementation leads to the successful medical treatment outcomes for patients and optimal cost consideration for healthcare service providers. The higher quality of data, the decision making will be better accurate and timely. Decision making (IT7) in this study refers to the ability to apply the information and technology for decision making in strategical levels. Technology platform for customers (IT5) and Technology platform for suppliers (IT6) were defined as the abilities to provide

and interchange useful information on technology platform with customers and suppliers, respectively. Technology platform for customers or medical tourists (IT5) performance measurement refers to the activities of facilitating medical information to potential patients through websites, social media and communicating effectively about the essential steps for patients (Cho et al., 2012; Ellram et al., 2004).

Additionally, technology platform for suppliers (IT6) performance measurement relates to the capabilities that supporting the latest inventory information to suppliers and managing the historical data for demand forecasting between physical medical devices and upcoming medical tourists.

Besides, there are four remaining performance measurements in information & technology management dimension that practitioners ranked as the low importance weights and seem to have low impact for strategical level positions namely, Data tracking (IT8), Concrete network (IT4), New technology (IT2), and Device & network (IT3), respectively. The empirical result in this study provides convincing evidence against the existing review. A possible reason for this discrepancy might be that the measurements in healthcare service providers mainly aim about the successful rate of medical treatments and customer or medical tourists' satisfaction. The empirical result in Phase one (see Table 23) proposed the definitions of these four remaining performance measurements as follows. Data tracking (IT8) is about the ability to track the accurate data both upstream and downstream within medical tourism supply chain. Concrete network (IT4) defined as the ability to create the concrete and effective information network among intra- and inter-firms. New technology (IT2) represented the ability to adopt the new technology to support firm and customer demand. Device & network (IT3) means the ability to access information timely any time by firm technological device and networks.

Several studies have been undertaken relating as to the technology implementation in healthcare context such as Shahid, Rappon, and Berta (2019) examined the advantages of artificial neural networks to improve the cost reduction and support decision-making solution. Specially Entwistle et al. (2011) supports the notion of various types of information for healthcare service providers decision-making by using 'personal experiences. Milovic and Milovic (2012) claimed that data mining helps to predict trends of healthcare industry and its connection, which guides the knowledge and decision-making.

Proposition four: consequently, this activity has a great impact on the usage of information & technology for healthcare service providers decision-making. All issues and problems in medical tourism are probably about the front-line problem solving which needs critical thinking and decision-making skills. Failures in this dimension may have a direct negative impact on the overall effectiveness of the performance. The guidelines for information & technology management dimension, practitioners may need to track from medical and non-medical teams and simultaneously report the progress both upstream and downstream within medical tourism supply chain, which will enhance their performance and increase efficiency its service process. Outsourcing IT software or IT specialists would be the great option to support concrete network and data accessibilities and it also helps practitioners focusing on their strengths and competitive advantages.

7.3.5 Service Performance Management (SPM)

The empirical findings conform to results from study phase one, which indicates that service performance management dimension was ranked as the fifth preference order for medical tourism practitioners, with a normalised weight of 0.1266. There are six sub-attributes such as Team management (SP1), Accurate service (SP6), Standardization (SP5), Flexibility (SP2), Performance evaluation (SP4), and Pre- & post- service (SP3), respectively.

Service performance management in medical tourism industry is about the core activities to deliver services to medical and non-medical services to medical tourists. All service supply chain attributes are rooted to service performance dimension. The empirical result is linked with Cho et al. (2012) about the importance of human resource in service industry, as staffs had direct interaction with customers. Maull et al. (2012) also highlighted that interaction with customers essentially influences the service operations performance, so staffs will be the main integrators to coordinate customer requirements through service process. Furthermore, Meijboom, Schmidt-Bakx, and Westert (2011) articulated the critical issues of challenges in patient care by multiple service providers which require the strong cooperation between front-line staffs and medical practitioners leading to effectiveness and patient safety. The result in this phase contributed on top of that the notion of human resource has a significant impact on customer satisfaction and organisational service performance.

Although the main attribute of Service performance management dimension was ranked as the fifth of preference order, Team management (SP1) sub-attribute led the importance of service performance management in the top ten priority final weight list. In medical tourism service settings, author proposed a team management (SP1) as the ability to have and manage team management skill. According to the medical tourist safety is the top priority for medical treatment, team cooperation strongly needs to have effective coordination among front-line and medical practitioners (Meijboom et al., 2011). Accurate service (SP6) and Standardization (SP5) also have the influences for patient safety. Accurate service (SP6) refers to the ability that medical practitioners deliver the accurate service to patients and timely manner based on the standard from accreditation standardization. Standardization (SP5) measurement defined as the ability to maintain the service standardization based on JCI accreditation.

The three remaining sub-attributes in service performance management dimension consists of Flexibility (SP2), Performance evaluation (SP4), and Pre- & post- service management (SP3). Flexibility (SP2) refers to the ability to provide the service flexibilities such as service volume, speed, lead time, range of services and specification. Performance evaluation (SP4) defines as the ability to have concrete or rubric score for service performance evaluation such as profit margin, labour, productivity, customer satisfaction, facilities, average customer spend per time, employee turnover ratio and so forth. Pre- & post- service management (SP3) is about the ability to administer pre- and post-process service. In the medical tourism context, the finding is congruent with the work of Boon-Itt et al. (2017), which indicated that flexibility performance measurement is about the ability to serve medical tourists with several alternatives and flexibility such as physicians capacities, flexible schedules, short waiting time, various packages of medical treatment (Lunt & Carrera, 2010; H. Y. Wang, 2012).

Proposition five: therefore, the medical service would be provided the smooth interactions with medical tourists or patients. Since the attitude of medical tourism staffs directly coordinate with patients has a crucial impact on customer satisfaction, the motivation for practitioners is the critical issues to maintain efficient service operations and customer service delivery with courtesy. Hence, it should be noted that team management performance measurement contributes (Cho et al., 2012). In addition, practitioners in this study also raised the important of the appropriate performance evaluation in both medical and non-medical sections (Palang & Tippayawong, 2019; B. Wang,

Kang, Childerhouse, & Huo, 2018). The performance evaluation proposition should be discussed both assessed staffs and assessors to find the middle point of performance evaluation and effective human resource planning management. Moreover, medical tourists tend to pay attention to the pre- & post- service which influences the positive testimonial and customer satisfaction. So, practitioners should track the customer feedbacks and provide the essential information after their treatment (Ellram et al., 2004; Meijboom et al., 2011).

7.3.6 Supplier Relationship Management (SRM)

Supplier relationship management (SRM) dimension was ranked as almost the lowest important preference order for medical tourism practitioners in this study, with a normalized weight of 0.0715. Supplier relationship management is the fundamental function for medical tourism supply chain, in which suppliers may deliver to medical service delivery and interact with patients (Cho et al., 2012; Somabutr, Pandian, & Roh, 2020). Medical tourism supply chain has its own complex network which consists of various departments relating both medical and non-medical contexts for example suppliers may provide food and drinks for catering department, medical device suppliers may facilitate the specific equipment to each department, and IT service from outsourcing team may proceed useful information through downstream and upstream through medical tourism supply chain. Cho et al. (2012) suggested that suppliers have significant role to support service through outsourcing, which involves supplier relationship management. Ellram et al. (2004) claimed that supplier relationship management was about the managerial skill to ensure the agreement between specification of services as customer demand and service capacities. Additionally, Baltacioglu et al. (2007) also discussed that supplier relationship management through medical tourism supply chain would enhance the procurement strategies and efficient service design.

Although each of these influential studies has claimed that supplier relationship management is imperative, the empirical result provides evidence against the overall existing literature review. SRM was ranked as the sixth of overall preference orders. In this study, the proposed SSC performance measurements were established based on the broad view from specific group in this study. Almost all practitioners in strategical level may focus on the overview of marketing strategy rather supplier and auxiliary support. Demand and supply need to work parallelly to maintain the service operations and customer satisfaction. Even though the empirical

study ranked SRM as nearly the lowest preference order, the practitioners still cope with every issue anyway by making the final decision and articulate the proactive plans for potential mutual benefits for suppliers. There are 4 proposed performance measurements in supplier relationship management dimension including (SR4) Key suppliers, (SR1) Supplier relationship, (SR2) Partnership programme, (SR3) Supplier performance, arranged by the high to low importance respectively.

Key supplier classification (SR4) was maximized as the top rank of supplier relationship management dimension. Key supplier classification was defined as the ability to prioritise the key suppliers to increase the supply chain quality. Key supplier classification is associated with Supplier performance (SR3) performance measurement. In this study, Supplier performance (SR3) was defined as the ability to evaluate the supplier performance against multiple criteria assessments at the strategic, operational, and tactical level. Ellram et al. (2004) discussed the process of supplier relationship management may support the procurement section. The empirical result is constant with Boon-Itt et al. (2017) about the importance of the combination between customer demand and supply & resources management (de Vries & Huijsman, 2011).

The empirical finding is congruent with the work of Chubing Zhang, Wang, Cui, and Han (2020), which pointed out that interpersonal trust and interorganizational trust were influences by purchasing agent function relating to the Supplier relationship (SR1) and Partnership programme (SR2) performance measurements in this study. Supplier relationship (SR1) performance measurement was proposed as the ability to create long-term relationship with suppliers. Partnership programme (SR2) was defined as the ability to maintain the close relationship with suppliers e.g., develop a partnership programme with suppliers for mutual benefits.

Proposition six: therefore, maintaining healthy relationships with suppliers emerges as one of the critical tasks for the medical tourism and capacity & resources management dimension (Mettler & Rohner, 2009). The importance of supplier relationship has been explicitly known from several existing literature review in SSC. Boon-Itt et al. (2017) conceptualized the importance of supplier relationship based on key component such as cooperation, commitment, coordination, information exchange and feedback. Cho et al. (2012) highlighted that maintaining relationship with key suppliers may help to improve service quality. To improve the overall service quality and customer satisfaction, hospitals may be able to assess the quality of received physical resources sourcing and human resources allocation related to medical and non-medical departments. In medical tourism

context, procurement work is sensitive for medical devices and medicine due to the high volume and specific details.

7.3.7 Capacity & Resource Management (CAP)

The empirical findings conform to results from study phase one, Capacity & resource management (CAP) dimension was ranked as the least important preference order for medical tourism practitioners in this study, with a normalized weight of 0.0698. There are six sub-attributes such as Tangible resources (CP1), Service readiness (CP5), Real-time demand fluctuation (CP4), Optimum service capacity (CP6), Alternative resources (CP3), Intangible resources (CP2), respectively.

Capacity & resource management in medical tourism setting is about the core activity to manage, plan and allocate the resources through service operations (Baltacioglu et al., 2007; Ellram et al., 2004; Meijboom et al., 2011). All sub-attributes or proposed performance measurements, in capacity & resource management dimension, are basically rooted to all service supply chain dimensions. Capacity & resource management supports the backstage of practitioners work to allocate both medical and non-medical tangible and intangible resources, in which have been associated directly with supplier relationship and demand management dimensions. To manage the flow of organisation resources and handle with shortage issues, the empirical result is linked between Boon-Itt et al. (2017) and Tangible resources management (CP1), Intangible resources management (CP2) and Service readiness (CP5) performance measurements in this study about the importance of effective resource utilization. In terms of medical tourism context, Tangible resources management (CP1) is ability to manage tangible resources allocation such as medicine inventory, medical practitioners' capacity, transportation, all facilities, medical and non-medical zones, valet parking and space for temporary events and so forth. Intangible resources management (CP2) is the ability to manage intangible resources allocation such as medical professionalism knowledge classified into each subcategory of medical doctors (E.g., Surgeon, Obstetrics and Gynaecology, Paediatrics, physical therapy), language management and medical advancement knowledge. In addition, Service readiness (CP5) is linked with Real-time demand fluctuation (CP4) performance measurement. Service readiness (CP5) is about the ability to provide service to customer with least waiting time. Real-time demand fluctuation (CP4) is about the ability to ensure the service process has sufficient resources and service capacity to operate the fluctuated patients'

demand in the most cost-effective manner. The empirical result shows that the service readiness with short waiting time is likely to get better satisfaction and obtain positive testimonials.

Regarding the difficulty of balancing demand and supply, Real-time demand fluctuation (CP4) and Optimum service capacity (CP6) measurements may mitigate the supply shortages and excess inventory. Author proposed that Real-time demand fluctuation (CP4) measurement is the capability to ensure the service process has sufficient resources and service capacity to operate the fluctuated patients' demand in the most cost-effective manner. Optimum service capacity (CP6) is about the ability to adjust the service capacity with the optimum point between peak and minimum points of demand. Due to the complicate issues within healthcare service providers, the empirical result is linked with Cho et al. (2012) about the support of capacity resource management dimension.

Proposition seven: Capacity and resource management dimension was ranked as the least important preference order in this study; however, it may reflect the service performance though effective management and decisive problem solving during peak and low demand (Handfield & Bechtel, 2002; Sampson, 2000). The difficulty of capacity and resource management on medical tourism industry is also to balance demand and firm capacity effectively within the constraints, facilities, and firm operations. To provide the responsive services, scheduling is essential to incorporate the capacity management to have a smooth flow of physical and non-physical resources (Cho et al., 2012; Handfield & Bechtel, 2002). Therefore, capacity & resources management dimension is also one of the influential performance measurements in SSC for medical tourism context.

To minimize bias and support the quality of this study, an overview of the empirical results was discussed and shared with practitioners for validation. Practitioners upheld this finding which made the positive contributions and pointed out the opportunities to improve their performance as the guideline for service quality improvement. Besides, practitioners also provided the recommendations in each main SSC in study phase one and study phase two, which they found the consistent and significance to Thai medical tourism. In addition, study phase two finding were presented to executive team for further validation.

7.4 Discussion of study phase III

To narrow down the implications of the SSC performance measurements and the associated variables, the nuanced understanding they provide can be leveraged to revolutionize service delivery within the medical tourism industry.

Dependent variables, particularly 'Individual Preference (PM5)' and 'Key Supplier's Prioritisation (PM10)', play a critical role in providing a customized service that caters to the dynamic needs of medical tourists. The data emphasize the necessity for flexibility and adaptability in service provision, which can only be achieved through a comprehensive understanding of customer preferences and a well-managed supply chain. The ability to adjust to changes in customer behavior and to manage key suppliers effectively can dramatically improve the overall performance of the service provider.

Linkage variables bring to light the indispensable role of effective communication and the need for a feedback mechanism in enhancing service quality. 'Advertisement (PM1)', 'Courtesy (PM4)', 'Customer Feedback (PM6)', and 'Team Management (PM7)' serve as channels of communication and interaction among various stakeholders, including patients, potential medical tourists, and the internal team. Moreover, customer feedback can serve as a powerful tool for continuous improvement and innovation, enabling healthcare providers to keep pace with changing market demands and expectations.

Independent variables stress the importance of brand loyalty, resource management, and information utilization in driving the success of healthcare providers within the medical tourism industry. 'Brand Loyalty (PM2)' emphasizes the role of trust and credibility in attracting and retaining customers. 'Supply & Demand Balancing (PM3)' highlights the need for an efficient management system that ensures service availability in line with patient demand. 'Smooth Customer Journey (PM8)' underscores the importance of patient satisfaction and experience, which can be enhanced through seamless service delivery and clear directions. 'Usage of Up-to-date Information (PM9)' underlines the significance of real-time data in decision-making processes and in maintaining the balance in the supply chain.

By addressing these variables and their interrelationships, medical tourism practitioners can create an environment that promotes efficient service delivery, customer satisfaction, and overall service improvement. In this context, the importance of data and analytics cannot be overlooked, as they enable organizations to measure and assess performance effectively, make informed decisions, and strategize for future growth. The interplay of these factors, therefore, forms a robust

framework for performance measurement and continual enhancement within the medical tourism industry. This deeper understanding of SSC performance measurements and variables, combined with strategic implementation, could potentially elevate the global standing of the Thai medical tourism industry.

7.5 Summary

This chapter presents the significant findings obtained during the empirical phases, which were conducted in a sequential manner. The discussion follows the order of the empirical phases, and the propositions derived from the SSC performance measurements are adequately supported. In the next chapter, conclusions are provided, along with implications for research and future directions. Ultimately, a comprehensive conclusion will be drawn based on the research conducted.

Chapter 8 Conclusion

8.1 Overview

The impact of SSC performance measurements proposition has been extensively investigated in this study and provide guidelines and strategies to policies makers. This chapter aims to discuss the overall findings from phase one to phase three along with the direction of future research. This chapter then starts by discoursing the primary research question which leads to six research objectives, then discussing the relevant findings to each research objective. The remainder of this chapter describes the theoretical contribution, practical implication, and policy implication. The limitation of this study and the direction of future research are also suggested.

8.2 Meeting the Aim and Objectives of this Thesis

The main research question is ‘how can healthcare service providers in Thai medical tourism industry improve service supply chain performance?’ To answer the research question, this study established the research objectives setting which mentioned in Chapter 1. The main aim of this study is ‘to explore the SSC performance measurements leading to the medical tourism key success factors and prioritize the determinant measurements affecting service operational performance’. The sequences of research objectives and findings from each objective are discussed in this chapter.

8.2.1 Objective one: To identify the characteristics of medical tourism supply chain

To achieve this objective, the relevant extensive literature reviews consisted of medical tourism definitions, the global medical tourism industry, the situation of medical tourism industry in Thailand were reviewed in Chapter two. Furthermore, the foundation of service supply chain also reviewed to analyse and refined the potential characteristics of medical tourism supply chain before performance measurement development. The characteristics of medical tourism supply chain were explored and filled the gap to the extant literature findings.

Author then defined the medical tourism supply chain as follows to understand its characteristics before extracting the service performance measurements (Somabutr, Pandian, & Roh, 2022).

‘Medical tourism supply chain is the network of suppliers and service providers, who are mainly associated with delivering medical treatments and tourism services to the foreigners in the specific country or their chosen destination.’

The proposed definition was validated and by experts in Thailand and discussed within the attended international conferences.

8.2.2 Objective two: To analyse the role of service supply chain management through the lens of medical tourism industry

Relevant medical tourism and service supply chain management were review in Chapter two to understand the fundamental knowledge. After that finding was shown in Chapter three through the conceptual framework after obtaining the characteristics of medical tourism supply chain. Findings revealed that the traditional supply chain management and service supply chain management are rooted from the same principle, but the input is different based on the concept of customer-supplier duality of Unified Service Theory in Sampson (2000) study. The role of service supply chain management refers to the bidirectional relationship between customers and suppliers may act as the same position.

Following the importance of the Unified Service Theory, author considers the uniqueness of medical tourism industry with regards to the Unified Service Theory. Medical tourism is the combination between healthcare and tourism industries, which means that customer demand is essential as the key information or customer-input. Customer or medical tourist is the primary supplier to input the service process by themselves which refers to Sampson’s study (2000) in the concept of customer being supplier as “Customer-supplier duality”. Customer-supplier duality presents the bidirectional relationship of service supply chain, which means the production process can be communicated in two-way for effective communication.

Based on the extensive literature reviews about service supply chain (Sampson, 2001; Sampson & Froehle, 2006; Sampson & Money, 2015; Sampson & Spring, 2012a), medical tourism is one of the service industries which has its own complex supply chain, and it is more appropriate to analyse through service supply chain not traditional supply chain. Due to the characteristics of

services including perishability, heterogeneity, intangibility, and simultaneity (Parasuraman, Zeithaml, & Berry, 1985, 1994), this study is analysed based on the suggestions from previous research (Cho et al., 2012; Ellram & Murfield, 2019; Ellram et al., 2004) which focused on the adoption of service supply chain management in healthcare and hospitality industries.

In this study, the seven critical activities of service supply chain management are also reviewed based on medical tourism characteristics from the existing literature reviews (Baltacioglu et al., 2007; Boon-itt & Pongpanarat, 2011; Boon-Itt et al., 2017; Cho et al., 2012; Laosirihongthong et al., 2018) (see Figure 20, chapter 3). As stated by the above discussion, the Unified Service Theory mainly applied to the creation of customer-supplier duality framework of medical tourism supply chain. The Unified Service theory (UST) not only focus on the combination of bidirectional relationship within medical tourism supply chain from various participants but also identified the service supply chain performance measurements which were linked to overall service improvement guideline and strategies propositions. Hence, objectives one and two offer a conceptual model framework for medical tourism supply chain, however, the extant literature failed to mention an explicit bidirectional relationship both demand and supply sides among all medical tourism characteristics.

8.2.3 Objective three: To establish the service supply chain performance measurements towards medical tourism industry perspective

To establish the service supply chain performance measurements of medical tourism, this study reviewed systematically extensive literature review about SSC performance constructs in any service industry covering twenty years between 2001-2021. This study initially established service performance measurements through healthcare service providers perspective penetrated tacit knowledge from exploratory study. Noted that there were 66 healthcare service providers holding International accreditation (JCI) at that time, a total of 20 staffs from 9 healthcare service providers participated in this study and allowed to collect the primary data on-site only because of the appropriateness and Thai seniority culture. The explored SSC performance measurements were proposed and listed in Chapter three with the detail of description of 41 SSC performance measurements.

8.2.4 Objective four: To critically prioritize whether some of those refined SSC performance measurements are more influential than other factors

The refined SSC performance measurements were brought from chapter 5 (study phase one) by using the survey data collected from Thai practitioner in medical tourism industry. Then, study phase two or chapter 6 revealed the prioritization of the SSC performance measurements. The prioritization was measured by conducting AHP to perceive the relative weight of each of proposed SSC measurements. Analysis of group decision-making shows that Customer relationship and Order process management as the first and the second most influential for consideration when measuring service performance for healthcare service providers in medical tourism supply chain respectively.

AHP also identified that Advertisement from Customer relationship management dimension as the most important preference order, followed by Brand royalty and demand and supply balancing of demand management dimension. Findings from this chapter established Capacity & resources management as the least ranking of SSC main attribute dimension.

Based on the prioritization findings provided seven propositions for seven main constructs of SSC. Firstly, customer relationship management in this empirical study has an important role to help Thai practitioners from JCI healthcare service providers have shed the lights on performance measurement to have a better understanding of the medical tourist's behavior, study about the influential factors that drive success and customer satisfaction, and competitive advantage, and opportunities and challenges (Guerola-Navarro et al., 2021; Pizam et al., 2016; Anthony Woodhead, 2013). Thai practitioners should maintain its customer relationship management strategy, which supports and strengthens their competitive advantage to bridge the medical tourist's trend and current facilities and service improvement.

Secondly, Order process management dimension in medical tourism begins with the initiation of patient's appointment from reservation system through patient's admission. The core function of order process management is to translate medical tourist preferences or patients' requirements through the service process correctly and to make the smoothest customer journey if the patients are maintained. Therefore, order process management dimension has a great impact on medical tourist's perception of healthcare service delivery and satisfaction. Failures in this dimension may

have a direct negative impact on the overall effectiveness of the service performance. The guidelines for order process management improvement, staffs may need to follow up from medical and non-medical teams and simultaneously report the progress status to medical tourists, which will enhance their satisfactions and increase efficiency its service process.

Thirdly, the proposition about demand management is about well preparation for prompt services when medical tourists would arrive at service points, which requires the strong collaboration from staffs and other stakeholders nearby hospital. It is impossible to get the exact number of medical tourists, Thai practitioners prioritised higher importance weight of supply chain balancing rather than demand forecasting. All issues and problems in medical tourism are probably about the front-line problem solving which needs critical thinking and decision-making skills. Additionally, Thai practitioners recognised demand forecast as the least important preference order in demand management dimension. The rationale is about the unpredictable demand problem. They believed that there is no perfect plan for demand forecast. Therefore, the important weight of demand forecasting ranks the last position in this dimension.

Fourthly, the usage of information & technology has a great impact on healthcare service providers decision-making. All issues and problems in medical tourism are probably about the front-line problem solving which needs critical thinking and decision-making skills. Failures in this dimension may have a direct negative impact on the overall effectiveness of the performance. The guidelines for information & technology management dimension, practitioners may need to track from medical and non-medical teams and simultaneously report the progress both upstream and downstream within medical tourism supply chain, which will enhance their performance and increase efficiency its service process. Outsourcing IT software or IT specialists would be the great option to support concrete network and data accessibilities and it also helps practitioners focusing on their strengths and competitive advantages.

Fifthly, Although the main attribute of Service performance management dimension was ranked as the fifth of preference order, Team management (SP1) sub-attribute led the importance of service performance management in the top ten priority final weight list. The proposition in this dimension was suggested the medical service would be provided the smooth interactions with medical tourists or patients. Since the attitude of medical tourism staffs directly coordinate with patients has a crucial impact on customer satisfaction, the motivation for practitioners is the critical issues to maintain

efficient service operations and customer service delivery with courtesy. Hence, it should be noted that team management performance measurement contributes (Cho et al., 2012). In addition, practitioners in this study also raised the importance of the appropriate performance evaluation in both medical and non-medical sections (Palang & Tippayawong, 2019; B. Wang et al., 2018). The performance evaluation proposition should be discussed both assessed staffs and assessors to find the middle point of performance evaluation and effective human resource planning management. Moreover, medical tourists tend to pay attention to the pre- & post- service which influences the positive testimonial and customer satisfaction. So, practitioners should track the customer feedbacks and provide the essential information after their treatment (Ellram et al., 2004; Meijboom et al., 2011).

Sixthly, the proposition to maintain healthy relationships with suppliers is one of the critical tasks for the medical tourism and capacity & resources management dimension (Mettler & Rohner, 2009). Key supplier classification (SR4) was maximized as the top rank of supplier relationship management dimension. To improve the overall service quality and customer satisfaction, hospitals may be able to assess the quality of received physical resources sourcing and human resources allocation related to medical and non-medical departments. In medical tourism context, procurement work is sensitive for medical devices and medicine due to the high volume and specific details.

Seventhly, Capacity and Resource Management dimension was ranked as the least important preference order in this study; however, it may reflect the service performance through effective management and decisive problem solving during peak and low demand (Handfield & Bechtel, 2002; Sampson, 2000). The difficulty of capacity and resource management on medical tourism industry is also to balance demand and firm capacity effectively within the constraints, facilities, and firm operations. To provide the responsive services, scheduling is essential to incorporate the capacity management to have a smooth flow of physical and non-physical resources (Cho et al., 2012; Handfield & Bechtel, 2002). Therefore, capacity & resources management dimension is also one of the influential performance measurements in SSC for medical tourism context.

Hence, Thai practitioners upheld this finding which made the positive contributions and pointed out the opportunities to improve their performance as the guideline for service quality improvement.

Besides, each main SSC in study phase one and study phase two, which they found the consistent and significance to Thai medical tourism.

8.2.5 Objective five: To evaluate the interrelationships among the importance of service supply chain performance measurements

Findings from study phase three were used ISM and MICMAC analysis approach to illustrate the interrelationships among the importance of service supply chain performance measurements to achieve its objective. To develop an ISM model that defined the interrelationship, interviews were chosen and conducted with the same samplings to continue the consistency of expert judgement. In conformity to study phase one, author explored and establish SSC performance measurements from exploratory study which included 41 SSC performance measurements. In addition, consistent with study phase two, 80/20 of the Pareto rule adopted to refine the top ten of all 41 measurements and indicated as the elements for establishing matrix in study phase three. Study phase three then suggested the model of interrelationship among top ten measurement to see their relationship and highlight which measurement should put greater attention based on priority and rapid changes in medical tourist behavior.

8.2.6 Objective six: To propose guidelines and strategies for MTSC performance improvement

Findings from phase one, two, three enabled this study to achieve all research objectives, every single phase also included the proposed recommendations. In phase one, the guidelines and recommendations were presented in chapter five showing the combination between healthcare and tourism industry. Phase two findings were validated by using AHP to obtain the list of prioritizations. The proposed strategies and recommendation were also described in five and six. Furthermore, phase three provided the guidelines to evaluate the interrelationship among the top ten of refined performance measurements (see chapter 6, study phase three)

To fully improve the overall service performance in terms of the supply chain within medical tourism, all these SSC performances should be employed and consulted across the collaborations among Thai tourism authority and hospital chain whose holding accreditation or target hospital for medical tourists.

8.3 Key Finding of this thesis

The empirical study conducted in multiple phases yielded several key findings that shed light on the service supply chain (SSC) performance in the medical tourism industry. In the initial phase, researchers identified 41 new SSC performance measurements across seven principal themes based on insights from participants representing various regions of Thailand.

Building upon these findings, the second phase focused on prioritizing the SSC performance measurements using the Analytical Hierarchy Process (AHP). The results revealed that Customer Relationship and Order Process Management emerged as critical factors for measuring service performance. Specifically, 'Advertisement' from the Customer Relationship Management dimension was identified as the most significant preference order, followed closely by 'Brand Royalty' and 'Demand and Supply Balancing' from the Demand Management dimension. However, 'Capacity & Resource Management' ranked the lowest among the SSC main attribute dimensions.

To further explore the interrelationships among the top 10 SSC performance measurements, the third phase employed Interpretive Structural Modelling (ISM). The analysis highlighted the delivery of services based on individual preferences (PM5) as the most crucial performance measurement. This finding emphasizes the importance for healthcare service providers to remain attentive to the dynamic changes in medical tourist preferences and understand patient behavior and motivations. Interestingly, even though 'individual preference' (PM5) did not rank as highly as 'advertisement' (PM1) in the second phase, the significance of effective communication through advertising in overall service improvement remained consistent.

The study also underscored the need for close collaboration with Thai practitioners to achieve effective service performance evaluation and management within the service supply chain. Such collaboration is vital not only for internal service improvement but also for enhancing the brand image of the Thai medical tourism industry. By aligning with long-term service performance assessment guidelines set by policymakers, such as the Ministry of Tourism authority and the Government, the industry can be better prepared to accommodate the potential influx of international medical tourists.

Overall, these findings emphasize the significance of customer relationships, understanding individual preferences, effective communication, collaboration, and strategic planning in optimizing service performance within the medical tourism industry. By prioritizing the identified SSC performance measurements, healthcare service providers can enhance their competitiveness, improve service delivery, and contribute to the growth and success of the Thai medical tourism sector.

8.4 Research contribution and Novelty

The research conducted in this study introduces several novel contributions in the context of SSC performance measurements in the Thai medical tourism industry. This study makes significant contributions to both theory and practice in the field of medical tourism. In terms of theory, the research extends existing literature by identifying and categorizing 41 new service supply chain (SSC) performance measurements across seven principal themes. The study also introduces a novel conceptual framework for the medical tourism supply chain, incorporating both the demand and supply sides. By enhancing the understanding of system theory and the Unified Service Theory, the research provides insights into the dynamics of service configuration within the medical tourism industry.

Furthermore, the study contributes to the body of knowledge by examining the combination of healthcare and tourism industries through the lens of the Unified Service Theory. It supports the notion of customer-supplier duality and emphasizes the bidirectional relationship in the service supply chain context, with a specific focus on medical tourism. The research findings shed light on the importance of effective communication, collaboration, and understanding individual patient preferences in improving overall service performance.

In terms of practical implications, the study offers valuable insights for healthcare service providers and managers in the Thai medical tourism industry. It highlights the significance of customer relationships, effective communication, and collaboration in enhancing service quality and performance. The research emphasizes the need for healthcare providers to stay attentive to changing medical tourist preferences and utilize advertising as a means of communication to influence service improvement. The study also underscores the importance of close collaboration with Thai practitioners to achieve effective service performance evaluation and management within the medical tourism supply chain.

The research makes several contributions and novel findings. It addresses a research gap by developing and prioritizing SSC performance measurements specific to the medical tourism industry. The use of a mixed-method approach in the empirical analysis enhances the validity and reliability of the findings. Additionally, the study introduces a novel conceptual framework for the medical tourism supply chain, incorporating both the demand and supply sides, which provides a comprehensive understanding of the industry dynamics. The application of the Unified Service Theory to the creation of a customer-supplier duality framework within the medical tourism supply chain is a unique contribution. The use of Interpretive Structural Modelling (ISM) to examine the interrelationships among SSC performance measurements further advances the understanding of this complex system.

It provides guidance for policymakers to develop programs and guidelines for convenient visa immigration and smooth customer journeys for potential medical tourists. The study also emphasizes the potential of Thai hospitality services and suggests strategies for strengthening competitive advantages through customer relationship management. Moreover, it highlights the importance of utilizing information technology and collaboration to enhance intra-organizational performance within the medical tourism supply chain. The findings contribute to the strategic planning efforts of The Tourism Authority of Thailand (TAT) and provide valuable insights for stakeholders to sustain their competitive advantages.

This study also brings novelty to the field of medical tourism research through its methodological approach and the unique insights it provides. The use of a mixed-method approach, incorporating both qualitative and quantitative data collection and analysis, adds depth and richness to the findings. This comprehensive approach ensures a more robust understanding of the complex dynamics within the medical tourism supply chain. The study's introduction of a novel conceptual framework for the medical tourism supply chain fills a gap in the existing literature. By incorporating both the demand and supply sides, the framework captures the intricacies and interdependencies of the industry. This holistic perspective allows for a more comprehensive analysis of the factors influencing service performance in medical tourism.

Another notable aspect of the study's novelty is its application of the Unified Service Theory to the context of medical tourism. While the Unified Service Theory has been applied in various service industries, its application to the medical tourism supply chain is relatively unexplored. By examining the bidirectional relationship between customers and suppliers, the study offers new

insights into the service configuration and dynamics within the medical tourism industry. This contributes to the theoretical understanding of how service performance can be effectively measured and managed in this unique context.

Moreover, the research employs Interpretive Structural Modelling (ISM) to uncover the interrelationships among SSC performance measurements in medical tourism. This methodological approach provides a novel perspective on the complex interactions and dependencies among the identified performance measurements. By revealing the hierarchy and interdependencies, the study offers valuable insights into the factors that have the most significant impact on service performance in the medical tourism industry. Overall, the study's methodological rigor, novel conceptual framework, application of the Unified Service Theory, and use of ISM contribute to the novelty and advancement of the field of medical tourism research. These novel elements enhance the understanding of the complexities and dynamics within the medical tourism supply chain, providing valuable insights for practitioners, researchers, and policymakers in the industry.

In summary, this study's contributions to theory and practice in the field of medical tourism are significant. The research extends existing literature, introduces a novel conceptual framework, and enhances the understanding of system theory and the Unified Service Theory. The practical implications provide guidance for healthcare service providers, managers, and policymakers in the Thai medical tourism industry. The research also makes novel contributions through its methodology, conceptual framework, and insights into the dynamics of SSC performance measurements within the medical tourism supply chain.

8.5 Research Implication

This study aims to explore the SSC performance measurements to guide the practitioner improving their overall service performance in healthcare service providers in Thai medical tourism. All three phases were empirically undertaken by mixed method of data collection and data analysis. The implications of this study are explained.

8.5.1 Implication to theory

This study extends the existing literatures by identifying the characteristics of medical tourism supply chain in the different ways. Author also introduced and proposed the definition of medical tourism supply chain based on the conceptual framework in this study. All results since phase one to three also enhanced the system theory and the Unified service theory which directly related to the medical tourism supply chain context (Chapter 3). Findings also denote and support the Unified service theory in terms of analyse the service configuration in service industry.

According to the importance of the Unified Service Theory, this study also contributes to the body of knowledge through medical tourism which supports the notion of the combination between healthcare and tourism industries. Findings pointed out that customer demand is essential as the key information or customer-input based on Customer-supplier duality. Customer-supplier duality presents the bidirectional relationship of service supply chain, which means the production process can be communicated in two-way for effective communication. Medical tourism covers the wide range of participants such as medical tourists or travelers, healthcare providers, and other from both public and private sectors. To analyze the medical tourism supply chain, the following elements are taken into account such as its chain structure, relationship between individuals (airlines, accommodations, healthcare providers, travel agencies, and medical tourists), and the measurement of medical tourism performance may include medical tourists' satisfaction at the healthcare providers and tourism attractions, financial performance, sustainable development of tourism, operational efficiency and so forth based on the targeted destination context.

As stated by the above discussion, the Unified Service Theory could be mainly applied to the creation of customer-supplier duality framework of medical tourism supply chain. Hence, using Unified Service Theory could help scholars and practitioners understand and investigate the service performance measurements in medical tourism supply chain and would use in other service industry where the appropriateness was matched. The novelty of the study's theoretical contributions is further highlighted by its emphasis on customer-supplier duality within the service supply chain context. By acknowledging the bidirectional relationship between customers and suppliers, the research underscores the importance of customer input and effective communication in shaping service performance. This novel perspective aligns with the Unified Service Theory and reinforces

the notion of combining healthcare and tourism industries. The study enhances understanding of system theory and the Unified Service Theory by specifically applying them to the medical tourism supply chain, thereby expanding the theoretical understanding of this field.

Moreover, this study performed as an empirical analysis in every phase to ensure the data transparency. The proposed SSC performance measurements open avenues for academics to undertake the comparative study and test the validity and reliability using Structural Equation Modelling with larger samples. Regarding future study, it would be interesting to find out the different measurements from medical tourism in other countries context. To date, this study also initially established the conceptual medical tourism supply chain through both demand and supply side, which explicitly help academics and practitioners understand deeper about the process flow of medical tourism supply chain through this empirical study.

8.5.2 Implication to practice/Managers

Thailand is in the strategical area, where people attempt to make decision due to its tourist attractions and uniqueness of food and culture. This study would benefit to the policy makers to provide the guideline in developing the programme for convenient visa immigration to potential medical tourists having the smoothest customer journey. According to receiving the financial endorsement from The Royal Thai Government, author also had the opportunities to discuss the result with the ministry of Tourism Authority of Thailand. For example, policy makers also shed lights on offering smoothest customer journey programme for inbound medical tourists or normal travelers can circulate in Thailand longer in case that they are in the visa immigration programme by registration in advance. Tourism is the promising industry which can generate the income by many approach (Connell, 2013; Connell, 2006). Tourism benefits during and after recuperation period is one of the impacts for Thai economy and investment in property (Connell, 2006; IMTJ, 2018; Moghavvemi, 2017). The longer period that international travelers are in Thailand, the higher income that tourism sector generates the revenues (Kim, 2021; Nikbin, 2019).

The finding in this study also raises the awareness of the potential of Thai hospitality service. Based on the results in every chapter shows that courtesy is one of the determinant variables that affecting the medical tourist's motivation. Akin to the existing literature reviews, the uniqueness of Thai culture may draw attention to potential medical tourist decision-making. The

implication of the study suggested that customer relationship management strategy may support and strengthen competitive advantage to bridge the medical tourist's trend and current facilities and service improvement.

Furthermore, the usage of information & technology has a great impact on healthcare service providers decision-making, but it is still overlooked. Based on the finding, the study suggested practitioners should track medical and non-medical teams to report the progress both upstream and downstream within medical tourism supply chain, which will enhance their intra-organizational performance and increase efficiency its service process. IT specialists from outsourcing company would be the great alternative to support concrete network and it also helps practitioners focusing on their strengths and competitive advantages.

Thai medical tourism sector is facing many challenges because of the rapid changes of medical tourist requirements (Wang, 2012), several countries substitution, competitive promotions from competitors (Ushakov, 2021) while the effects of COVID-19 pandemic disruption have also been observed. This research has extended the understanding of the medical tourism measurements development which influences the service quality improvement from the perspective of healthcare service providers. By making efforts to accommodate the importance of proposed SSC performance measurements, the study findings may help managers adapt the suggested SSC performance measurements to relevant intra-organisational departments and pursue greater understanding of changing medical tourist preferences. The proposed SSC performance measurements will enable non-JCI healthcare service providers and public hospital practitioners building the awareness of service performance perspective based on the service supply chain management to prioritise their tasks in an effective way to gain more revenue and high patients' satisfaction.

The contribution of this study cultivated the Thai medical tourism practitioners, policy makers and stakeholders to get prepared and plan strategically about service improvement in the future. To combine various insights from JCI accredited healthcare service providers, this study was originally undertaken the empirical study about SSC performance measurements based on evidence-based practitioners across Thailand. Furthermore, service performance may reflect the effective management and decisive problem solving in the organization. To provide the responsive services, collaboration is essential to incorporate the capacity management to have a smooth flow of physical and non-physical resources (Cho et al., 2012; Handfield & Bechtel, 2002).

In addition, the findings of this study are crucial for the strategic plans of The Tourism Authority of Thailand (TAT), an organization of Thailand under the Ministry of Tourism and Sports, to propose the supportive plans to all stakeholders in Thai medical tourism industry and encourage healthcare service providers to sustain their competitive advantages.

8.6 Research limitation

Notwithstanding this study proposed the implication of knowledge, policy maker and practices, there still have been the various limitation in this study. During the midst of April 2020, all parts of Thailand were lockdown. All inbound and outbound international and domestic flights had been suspended. All modes of transportation were ceased until June 2020 excluding shipping and postal service. Food, drinks, and basic needs shops have been available, but they restricted the number of customers and conform the social distancing policy. This phenomenon, people were requested to stay home and worn mask when staying outside. Additionally, Author required to stay in Thailand based on sponsor's request and would allow to return to the UK since The Royal Thai Government provided the international travel permission. Therefore, author would like to affirm that it was tough and challenging to plan travel itinerary, access hospitals to collect empirical evidence from potential respondents who have been involved in Thai Medical tourism industry based on high restrictions during COVID-19 pandemic.

First, because of the global disruption or COVID-19 pandemic in 2020-2021, author had the limited time span to collect empirical data on-site since February to March 2020. Author had few chances to conduct semi-structured interviews and undertake the observational study as field trips. Thus, data collection period was shortened and restricted due to COVID-19 pandemic, therefore the future research may conduct to compare the results and difference between pre- and post-covid-19. The performance measurements could be changed due to the medical capacity and resource and new normal lifestyle.

Second, the study focused on Thailand and did not consider other countries. The study results can be applied to other countries to check the general validity and reliability of the performance measurements. The results in this study may applied in terms of the potential service performance evaluation for Thai medical tourism. Future studies may conduct the comparative study to see the difference in service performance measurements. About data collection accessibility, the study can concentrate only JCI accredited healthcare service providers due to their previous potential and have strong the reputation through the JCI international portal (Henson,

2019; International JCI,2021). Therefore, future research may study to compare the performance measurements that JCI and non-JCI aim to implement to see the different findings.

Third, although finding from this study conducted as the empirical research, unfortunately, practical adoption of the service performance measurements was not implemented and tried out over the restrict time scale. In case of testing the performance measurements in service industry, author recommended that top level or management should have the clear and tacit vision for measurements establishment because it may consume time and require internal organization commitment.

To sum up, future research should use the larger sample size if researcher could have the data accessibility in healthcare service provider. The larger sample size may draw the better understanding and it is also important to other stakeholders within medical tourism industry for both related medical and non-medical services.

8.7 Future research recommendation

Future research in the field of medical tourism can build upon the findings and limitations of this study to further advance knowledge and understanding. Some potential research directions include:

- Researchers would conduct a comparative study to examine the similarities and differences in SSC performance measurements across different countries in the medical tourism industry. This comparative analysis can provide insights into the contextual factors that influence service performance and contribute to the development of country-specific strategies.
- Given the impact of the COVID-19 pandemic on the medical tourism industry, a longitudinal study can be conducted to assess the changes in SSC performance measurements and their implications over time. This would involve comparing pre-pandemic and post-pandemic data to understand the evolving dynamics and adaptation strategies within the industry.
- Researchers would explore the role of information technology and digital solutions in improving service performance within the medical tourism supply chain. Investigate how technologies such as telemedicine, electronic health records, and artificial intelligence can

be integrated to enhance communication, efficiency, and patient satisfaction. Additionally, the perspectives and experiences of different stakeholders within the medical tourism industry would be identified, including healthcare providers, medical tourists, travel agencies, and policymakers. Understanding their viewpoints can provide a comprehensive understanding of service performance and contribute to tailored strategies and interventions.

- Future research would examine the sustainability practices and ethical considerations within the medical tourism supply chain and investigate the impact of sustainable practices on service performance and explore ethical frameworks and guidelines for healthcare providers and policymakers in the industry.
- Future research may investigate the factors influencing patient decision-making in medical tourism and explore how patients evaluate and prioritize SSC performance measurements when selecting healthcare providers and destinations. This can provide insights into the key drivers of patient satisfaction and help healthcare providers align their services accordingly.

Overall, these future research directions can contribute to the ongoing development and improvement of service performance in the medical tourism industry. By addressing these areas, researchers can further advance theoretical understanding, inform practical strategies, and support the sustainable growth and success of the medical tourism sector.

8.8 Summary

This study establishes an originality and contributions relating to service supply chain management and Thai medical tourism context to provide the guidelines to practitioner and policy makers. This study employed the explicit research methods and theoretical underpinning to establish the proposed service supply chain performance measurements for Thai medical tourism. These seven main criteria presented, namely, demand management, capacity and resource management, customer relationship management, order process management, supplier relationship management, service performance management, and information & technology management. These should be implemented across medical tourism supply chain to improve the overall service performance. In addition, limitation and direction of future research are recommended in this chapter.

Appendices

Appendix 1 Thematic result reliability

Symmetric Measures				
		Value	Asymptotic Standard Error ^a	Approximate Significance
Measure of Kappa Agreement		.806	.133	5.221
N of Valid Cases		42		

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Appendix 2 Ethical Approval



Date: 20 February 2020

Dear Sutinee,

Ethical Approval Application No: FREIC1920.12
Title: Exploring the role of service supply chain management performance indicators of Thai medical tourism

Thank you for your application to the Faculty Research Ethics & Integrity Committee (FREIC) seeking ethical approval for your proposed research.

The committee has considered your revised application and is fully satisfied that the project complies with Plymouth University's ethical standards for research involving human participants.

Approval is for the duration of the project. However, please resubmit your application to the committee if the information provided in the form alters or is likely to alter significantly.

The FREIC members wish you every success with your research.

Yours sincerely
(Sent as email attachment)

Mr Derek Shepherd
Chair
Faculty Research Ethics & Integrity Committee
Faculty of Arts & Humanities (SoLCG & PBS)

Appendix 3 Research Information Sheet



Research Information Sheet

1. Research Project Title:

Exploring the role of service supply chain management performance indicators of Thai medical tourism

2. Research Invitation

You are being asked to take part in a research study on “Exploring the role of service supply chain management performance indicators of Thai medical tourism” Before you decide whether or not to participate, it is important that you understand why the research is being done and what it will involve. This information sheet explains the aims of the study. If there is anything that is unclear, or if you would like more information, please ask us. Your participation in this study is entirely voluntary.

3. What is the aim of this study?

The main aim of this study is to explore and prioritise the service supply chain management performance indicators leading to the medical tourism supply chain key success factors.

4. Why have I been chosen?

You have been chosen because we believe that you have the right expertise in the area of medical tourism supply chain. We also believe that the findings from this will have useful implication for improving service supply chain performance which you might be interested in.

5. Do I have to take part?

No. It is up to you to decide whether or not you wish to participate in this study. Your participation is entirely voluntary. If you agree to take part, we will then ask you to sign a consent form. You are free to withdraw any time without giving a reason.

6. What will happen to me if I take part?

If you choose to take part in this study, we will be asking for your opinion on medical tourism industry in particular service supply chain management perspective through interview, which will last about an hour. There aren't any right or wrong answers because we just want to hear about your opinion.

7. What are the possible benefits of taking part?

By participating in this study, you will help to improve our understanding of the potential and challenges of medical tourism industry in Thailand. You will have the opportunity to provide your expert opinion on current medical tourism supply chain management. The information we collect from you will contribute to our project samples and reach findings about improving medical tourism supply chain performance. If you are interested, we would be happy to provide you with a summary of research findings.

8. Will my taking part in this project be kept confidential?

All information collected about you during the project will be kept strictly confidential. You will not be able to be identified in any reports or publications. None the less, the name of your organisation may be acknowledged in the publications where appropriate with your permission.

9. Will I be recorded, and how will the recorded media be used?

The interview session may be recorded using a voice recorder with your permission. If you do not wish us to do this, we will then take notes instead.

10. Who is organising and funding the research?

University of Plymouth

11. Contact for further information

If you have any questions, please do not hesitate to contact PhD student Sutinee Somabutr: sutinee.somabutr@students.plymouth.ac.uk If you are dissatisfied with the way the research is conducted, please contact the Director of Studies in the first instance: shunmugham.pandian@plymouth.ac.uk If you feel the problem has not been resolved please contact the Faculty of Business Research Ethics Committee: FOBresearch@plymouth.ac.uk

Thank you for taking part in this research!

Appendix 4 Data Management Plan

Exploring the role of service supply chain management performance indicators of Thai medical tourism

Data Collection

What data will you collect or create?

Due to the nature of this research topic, this study will use both quantitative and qualitative data. This study will collect survey data and data from semi-structured interviews. In the survey, items are measured using a Semantic Differential Rating scale. Thus, the type and format of data of survey is text and DOCX. Survey data is expected to total between 100MB and 500MB.

In the semi-structured interview, data will be collected and stored using digital audio recording. Hence, the type and format of data of interviews is Digital video and MPEG4. Interviews data are expected to total around 2GB over the course of the project.

How will the data be collected or created?

In the context of semi-structured interviews, time allocated would be between 40 to 60 minutes with the respondents, which will be contacted via email and phone prior to the exercise. Questions will be sent to the participant prior to conducting the interviews. Data will be collected and stored using digital audio recording like MP3, Smart Phone. The interviews will be recorded and transcribed accordingly. This data will be anonymised and then processed and analysed using NVivo12.

The result of the survey will be recorded and collated using Excel spreadsheets.

Documentation and Metadata

What documentation and metadata will accompany the data?

The data will be accompanied by the following contextual documentation, according to the research project:

1. Spreadsheet documents which detail the result of the survey
2. Text files which detail the interviews' record

Files and folders will be named according to a pre-agreed convention. The final dataset as deposited in the university's OneDrive cloud system will also be accompanied by a README file listing the contents of the other files and outlining the file-naming convention used.

Ethics and Legal Compliance

How will you manage any ethical issues?

The potential study participants will be provided with appropriate information on the following points: research overview, data collection process and next step of the research. Additionally, the author will send a consent form to the participants to sign. Please see attached consent form for further details. The study investigator will certify that the research will be conducted with openness and honesty relating to the role of the investigator of this research. The participants have the right to ask any questions at any stage regarding this proposed research, and the investigator will answer those questions in order to maintain a high standard of ethics.

Any participants have the right to withdraw from the study at any time without giving any reason. All survey and interview data collected for this research will be treated confidentially. The study investigator will maintain the anonymity of participants and the confidentiality of the information that they provided in order to protect their privacy. Published work will always maintain the anonymity of any response and never identify the source.

How will you manage copyright and Intellectual Property Rights (IPR) issues?

Data will be owned by the Principal Investigator (Sutinee Somabutr) for access. This will be the anonymised data, not any data containing any possibly identifying features. The intellectual property of the data generated will remain with the University of Plymouth.

Storage and Backup

How will the data be stored and backed up during the research?

Data will be stored on an encrypted hard drive on a University of Plymouth institution laptop. It will be backed up on the secure Microsoft OneDrive cloud system.

How will you manage access and security?

Files created during this project will be encrypted so that only the principal investigator and author will be able to access them. Data will be transferred between the principal investigator researchers on memory storage devices rather than by email.

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

Any form of data related to this study will be kept securely and will be destroyed no more than 12 months after the PhD viva.

What is the long-term preservation plan for the dataset?

We will preserve the data for 12 months on university servers and then the data will be destroyed. If published and included as part of a wider thesis then it will also be stored in the University of Plymouth's PEARL system.

Data Sharing

How will you share the data?

The publication will be deposited in the University of Plymouth's PEARL system. The publication held in the PEARL system will be publicly searchable and discoverable.

Are any restrictions on data sharing required?

Data which underpins any publication will be made available at the time of publication. All unpublished data will be kept securely and will be destroyed no more than 12 months after the PhD viva.

Responsibilities and Resources

Who will be responsible for data management?

The principal investigator will be responsible for the data management aspect of this project.

What resources will you require to deliver your plan?

The researcher already has the required software including Excel and NVivo12 to implement the data collection plan. Fund of data collection will be supported by the University of Plymouth's FoB PGR Development Fund.

Appendix 5 Consent Form

CONSENT FORM

Title of research project: Exploring the role of service supply chain management performance indicators of Thai medical tourism

Name of researcher: Miss Sutinee Somabutr

Note: participants have the right to withdraw from the study at any time without giving any reason.

**Please
initial box**

1. I confirm that I have read the information sheet for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

2. I understand that my participation is voluntary and that I am free to withdraw from the study at any time without giving any reason.

☐

3. I agree to take part in the above study.

☐

Please tick box

Yes

No

4. I agree to the conversation being audio recorded.

☐☐

5. I agree to the use of anonymised quotes in publications.

☐☐

Name of Participant

Date

Signature

Researcher

Date

Signature

Appendix 6 Interview letter (Invitation)



Plymouth Business School
University of Plymouth
Drake Circus, Plymouth PL4 8AA
Devon, United Kingdom

Dear Sir or Madam,

As a PhD scholar in Plymouth Business School at University of Plymouth, I am Sutinee Somabutr. I am a sponsored student by Royal Thai Government. I am currently doing a research in the topic of “Exploring the Role of Service Supply Chain Management Performance Indicators on Thai Medical Tourism” with Dr. Shunmugham Pandian as my Director of Studies.

Since Thailand has become a hub of medical tourism destination in the Southeast Asia and counted as high potential industry for Thai economy development, the study of medical tourism supply chain is essential. Therefore, my research aims to explore and prioritise the service supply chain management performance indicators leading to the medical tourism supply chain key success factors. I am researching the extent to how service supply chain management performance indicators associate with Thai medical tourism key success factors.

Hence, I would like to invite you to participate as a member of expert panel to provide the various aspects of medical tourism challenges and opportunity in Thailand in particular in Logistics and Supply Chain Management perspective by having an interview. Every your response and individual contribution will be used only for academic purposes and all information about your organisation will be strictly confidential and anonymous. I would really appreciate if please could you kindly allocate the time for doing surveys around 20-35 minutes. With regards to the enquiries and you would like to receive an executive summary of my findings, please feel free to contact me.

Thank you very much for your kind co-operation.
I am looking forward to hearing your reply.

Sincerely yours,

Sutinee Somabutr

PhD Scholar in International Logistics,
Supply Chain and Shipping Management
sutinee.somabutr@students.plymouth.ac.uk
tss.sutinee@gmail.com
+44 (0) 78 0263 0183

Appendix 7 Interview protocol

Introductory questions

- What is your position in this organization?
- Please describe your job responsibilities and provide a brief overview of your organization?
- How many years have you been working in this organization/hospital?
- Within your background, how many years of your working experience relating the current position?
- What is your opinion about Thai medical tourism growth?
- Who are the main nationalities or targeted medical tourists?

Service supply chain management questions

- Can you please explain a brief overview of your roles which would be relevant to supply chain?
- Please describe your job responsibilities which would relate to service performance improvement?
- What do you think about the appropriateness of current service performance measures in your organization?
- To what extent, what do you think which measures could adapt to your organisation in the future?
- How would you describe the potential measurements that affect the service improvement of your organization?
- How would you describe and evaluate the importance of each service supply chain dimension?
- Demand management
- Capacity & resource management
- Customer relationship management
- Order process management
- Supplier relationship management
- Service performance management
- Information & Technology management
- In your opinion, please explain which one would have the most importance and least importance among service supply chain performance measurements?

Appendix 8 AHP questionnaire

ตัวอย่าง (Example)

ให้ท่านเลือก “วงกลม” ระบุเน้น การให้น้ำหนักค่าความสำคัญในแต่ละหมวดหมู่ตามที่ท่านได้ทำการเลือกจากด้านบน

ตัวชี้วัดประสิทธิภาพ	กลุ่มที่ 1	Demand Management
	กลุ่มที่ 2	Capacity & Resource Management
	กลุ่มที่ 3	Customer Relationship Management
	กลุ่มที่ 4	Order Process Management
	กลุ่มที่ 5	Supplier Relationship Management
	กลุ่มที่ 6	Service Performance Management
	กลุ่มที่ 7	Information & Technology Management

Indicators	Factor weighting score (การให้ค่าน้ำหนักเพื่อเปรียบเทียบความสำคัญ)																		Indicators
	มีความสำคัญมากกว่า						สำคัญเท่ากันกับ						มีความสำคัญน้อยกว่า						
1. DM	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2. CAP	
1. DM	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3. CRM	
1. DM	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4. OPM	
1. DM	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5. SRM	
1. DM	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6. SPM	
1. DM	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	7. ITM	

It means Demand management is **very strong important** over capacity and resource management.

It means Demand management is **equally important** to capacity and resource management

It means Demand management is **less strong important** than capacity and resource management

หมายความว่า ตัวชี้วัดกลุ่มที่ 1 Demand Management มีความสำคัญมากกว่า ตัวชี้วัดกลุ่ม 2 Capacity & resource management แบบมีนัยสำคัญ ในความคิดเห็นของท่าน

หมายความว่า ตัวชี้วัดกลุ่มที่ 1 Demand Management มีความสำคัญเท่ากับ ตัวชี้วัดกลุ่ม 4 Order process managementตามความคิดเห็นของท่าน

หมายความว่า ตัวชี้วัดกลุ่มที่ 1 Demand Management มีความสำคัญน้อยกว่าตัวชี้วัดกลุ่ม 3 customer relationship managementตามความคิดเห็นของท่าน

คำชี้แจง ให้ท่านได้สัญลักษณ์ “วงกลม” ในช่องคะแนน การให้น้ำหนักค่าความสำคัญในแต่ละหมวดหมู่ตามที่ท่านได้ทำการเลือกจากด้านบน

Instruction: Please select by putting the circle at the score that make pairwise comparisons between each construct.

Indicators	Factor weighting score (การให้ค่าน้ำหนักเพื่อเปรียบเทียบความสำคัญ)																	Indicators
	More important than								Equal			Less						
1.Demand Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	2.Capacity & Resource Management
1.Demand Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	3.Customer Relationship Management
1.Demand Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	4.Order Process Management
1.Demand Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	5.Supplier Relationship Management
1.Demand Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	6.Service Performance Management
1.Demand Management	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	7.Information & Technology Management

Indicators	Factor weighting score (การให้น้ำหนักเพื่อเปรียบเทียบความสำคัญ)			Indicators
	More important than important than	Equal	Less	

2.Capacity & Resource Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	3.Customer Relationship Management
2.Capacity & Resource Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	4.Order Process Management
2.Capacity & Resource Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	5.Supplier Relationship Management
2.Capacity & Resource Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	6.Service Performance Management
2.Capacity & Resource Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	7.Information & Technology Management

Indicators	Factor weighting score (การให้ค่าน้ำหนักเพื่อเปรียบเทียบความสำคัญ)	Indicators
	More important than important than Equal Less	
3.Customer Relationship Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	4. Order Process Management
3.Customer Relationship Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	5. Supplier Relationship Management

3.Customer Relationship Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	6. Service Performance Management
3.Customer Relationship Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	7. Information & Technology Management

Indicators	Factor weighting score (การให้ค่าน้ำหนักเพื่อเปรียบเทียบความสำคัญ)	Indicators
	More important than important than Equal Less	
4.Order Process Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	5. Supplier Relationship Management
4.Order Process Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	6. Service Performance Management
4.Order Process Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	7. Information & Technology Management

Indicators	Factor weighting score (การให้ค่าน้ำหนักเพื่อเปรียบเทียบความสำคัญ)	Indicators
	More important than important than Equal Less	
5. Supplier Relationship Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	6. Service Performance Management

5.Supplier Relationship Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	7.Information & Technology Management
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Indicators	Factor weighting score (การให้ค่าน้ำหนักเพื่อเปรียบเทียบความสำคัญ)	Indicators
	More important than important than Equal Less	
6. Service Performance Management	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	7.Information & Technology Management

ขอขอบคุณที่ท่านสละเวลาในการทำแบบสอบถามชุดนี้
ผู้วิจัยจะนำผลที่ได้ไปใช้ในการวิเคราะห์ผลในลำดับถัดไป

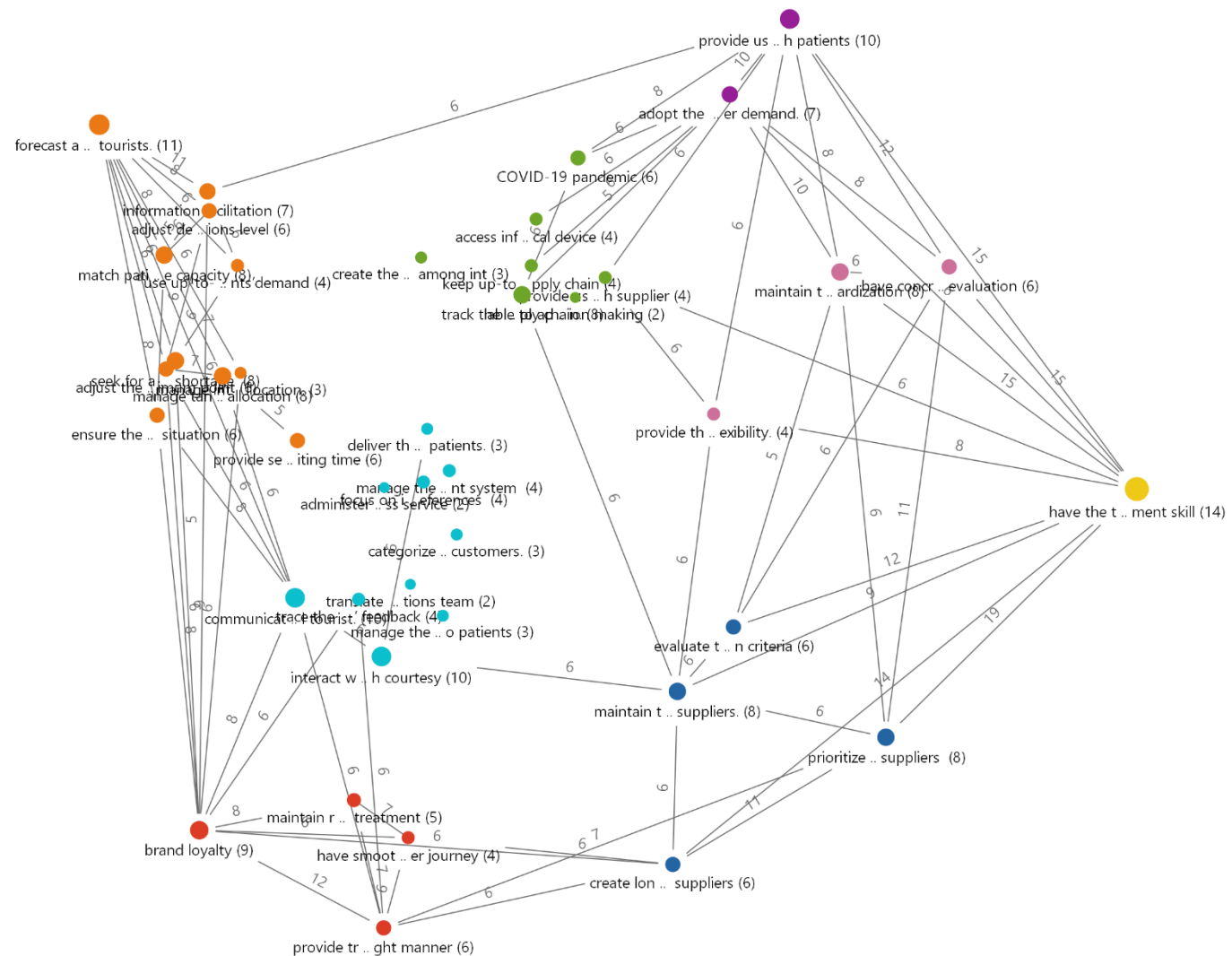
ขอขอบคุณค่ะ

Thank you for your valuable time and kind help for this research.
Kindest regards,

Appendix 9 MAQDA Code Matrix Browser results

[illegible]

Appendix 10 Thematic maps from MAXQDA (study phase one)



Appendix 11 Summary of AHP analysis for main attributes

Pairwise comparison matrix

	DM	CAP	CRM	OPM	SRM	SPM	ITM
DM	1.0000	4.0000	0.5000	0.5000	2.0000	2.0000	1.0000
CAP	0.2500	1.0000	0.2000	0.5000	1.0000	0.5000	1.0000
CRM	2.0000	5.0000	1.0000	4.0000	2.0000	3.0000	1.0000
OPM	2.0000	2.0000	0.2500	1.0000	2.0000	2.0000	1.0000
SRM	0.5000	1.0000	0.5000	0.5000	1.0000	0.2500	0.5000
SPM	0.5000	2.0000	0.3300	0.5000	4.0000	1.0000	1.0000
ITM	1.0000	1.0000	1.0000	1.0000	2.0000	1.0000	1.0000
Total	7.2500	16.0000	3.7800	8.0000	14.0000	9.7500	6.5000

Normalisation matrix

	DM	CAP	CRM	OPM	SRM	SPM	ITM	average	consistency
DM	0.1379	0.2500	0.1323	0.0625	0.1429	0.2051	0.1538	0.1549	7.6783
CAP	0.0345	0.0625	0.0529	0.0625	0.0714	0.0513	0.1538	0.0698	7.4259
CRM	0.2759	0.3125	0.2646	0.5000	0.1429	0.3077	0.1538	0.2796	7.9670
OPM	0.2759	0.1250	0.0661	0.1250	0.1429	0.2051	0.1538	0.1563	7.7632
SRM	0.0690	0.0625	0.1323	0.0625	0.0714	0.0256	0.0769	0.0715	7.5427
SPM	0.0690	0.1250	0.0873	0.0625	0.2857	0.1026	0.1538	0.1266	7.4378
ITM	0.1379	0.0625	0.2646	0.1250	0.1429	0.1026	0.1538	0.1413	7.5817
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	λ	7.6281
								CI	0.1047
								RI	1.3200
								CR	0.0793

Appendix 12 Summary of AHP analysis for demand management

	DM1	DM2	DM3	DM4	DM5
DM1	1.0000	0.3300	1.0000	0.5000	0.3300
DM2	3.0000	1.0000	2.0000	2.0000	2.0000
DM3	1.0000	0.5000	1.0000	1.0000	1.0000
DM4	2.0000	0.5000	1.0000	1.0000	1.0000
DM5	3.0000	0.5000	1.0000	1.0000	1.0000
Total	10.0000	2.8300	6.0000	5.5000	5.3300

Normalisation matrix

	DM1	DM2	DM3	DM4	DM5	Priority vector	Consistency
DM1	0.1000	0.1166	0.1667	0.0909	0.0619	0.1072	5.0530
DM2	0.3000	0.3534	0.3333	0.3636	0.3752	0.3451	5.1059
DM3	0.1000	0.1767	0.1667	0.1818	0.1876	0.1626	5.0902
DM4	0.2000	0.1767	0.1667	0.1818	0.1876	0.1826	5.1199
DM5	0.3000	0.1767	0.1667	0.1818	0.1876	0.2026	5.1437
Total	1.0000	1.0000	1.0000	1.0000	1.0000	λ	5.1025
						CI	0.0256
						RI	1.1200
						CR	0.0229

Appendix 13 Summary of AHP analysis for capacity and resource management

Pairwise comparison matrix

	CP1	CP2	CP3	CP4	CP5	CP6
CP1	1.0000	3.0000	1.0000	2.0000	1.0000	3.0000
CP2	0.3300	1.0000	0.5000	0.3300	0.2500	0.3300
CP3	1.0000	2.0000	1.0000	0.5000	0.5000	1.0000
CP4	0.5000	3.0000	2.0000	1.0000	1.0000	1.0000
CP5	1.0000	4.0000	2.0000	1.0000	1.0000	1.0000
CP6	0.3300	3.0000	1.0000	1.0000	1.0000	1.0000
Total	4.1600	16.0000	7.5000	5.8300	4.7500	7.3300

Normalisation matrix

	CP1	CP2	CP3	CP4	CP5	CP6	Priority vector	consistency
CP1	0.2404	0.1875	0.1333	0.3431	0.2105	0.4093	0.2540	6.3354
CP2	0.0793	0.0625	0.0667	0.0566	0.0526	0.0450	0.0605	6.2342
CP3	0.2404	0.1250	0.1333	0.0858	0.1053	0.1364	0.1377	6.2682
CP4	0.1202	0.1875	0.2667	0.1715	0.2105	0.1364	0.1821	6.2128
CP5	0.2404	0.2500	0.2667	0.1715	0.2105	0.1364	0.2126	6.2048
CP6	0.0793	0.1875	0.1333	0.1715	0.2105	0.1364	0.1531	6.2096
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	λ	6.2442
							CI	0.0488
							RI	1.2400
							CR	0.0394

Appendix 14 Summary of AHP analysis for customer relationship management

Pairwise comparison matrix

	CRM1	CRM2	CRM3	CRM4	CRM5	CRM6
CRM1	1.0000	0.5000	1.0000	1.0000	2.0000	2.0000
CRM2	2.0000	1.0000	2.0000	3.0000	4.0000	3.0000
CRM3	1.0000	0.5000	1.0000	2.0000	3.0000	4.0000
CRM4	1.0000	0.3300	0.5000	1.0000	3.0000	2.0000
CRM5	0.5000	0.2500	0.3300	0.3300	1.0000	0.5000
CRM6	0.5000	0.3300	0.2500	0.5000	2.0000	1.0000
Total	6.0000	2.9100	5.0800	7.8300	15.0000	12.5000

Normalisation matrix

	CRM1	CRM2	CRM3	CRM4	CRM5	CRM6	Priority vector	consistency
CRM1	0.1667	0.1718	0.1969	0.1277	0.1333	0.1600	0.1594	6.1962
CRM2	0.3333	0.3436	0.3937	0.3831	0.2667	0.2400	0.3267	6.2203
CRM3	0.1667	0.1718	0.1969	0.2554	0.2000	0.3200	0.2185	6.2722
CRM4	0.1667	0.1134	0.0984	0.1277	0.2000	0.1600	0.1444	6.1420
CRM5	0.0833	0.0859	0.0650	0.0421	0.0667	0.0400	0.0638	6.0867
CRM6	0.0833	0.1134	0.0492	0.0639	0.1333	0.0800	0.0872	6.0694
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	λ	6.1645
							CI	0.0329
							RI	1.2400
							CR	0.0265

Appendix 15 Summary of AHP analysis for order process management

Pairwise comparison matrix

	OPM1	OPM2	OPM3	OPM4	OPM5	OPM6
OPM1	1.0000	1.0000	0.2000	0.3300	0.2500	0.2500
OPM2	1.0000	1.0000	0.2500	1.0000	0.3300	0.3300
OPM3	5.0000	4.0000	1.0000	1.0000	4.0000	1.0000
OPM4	3.0000	1.0000	1.0000	1.0000	1.0000	1.0000
OPM5	4.0000	3.0000	0.2500	1.0000	1.0000	1.0000
OPM6	4.0000	3.0000	1.0000	1.0000	1.0000	1.0000
Total	18.0000	13.0000	3.7000	5.3300	7.5800	4.5800

Normalisation matrix

	OPM1	OPM2	OPM3	OPM4	OPM5	OPM6	average	consistency
OPM1	0.0556	0.0769	0.0541	0.0619	0.0330	0.0546	0.0560	6.3215
OPM2	0.0556	0.0769	0.0676	0.1876	0.0435	0.0721	0.0839	6.1675
OPM3	0.2778	0.3077	0.2703	0.1876	0.5277	0.2183	0.2982	6.7224
OPM4	0.1667	0.0769	0.2703	0.1876	0.1319	0.2183	0.1753	6.3438
OPM5	0.2222	0.2308	0.0676	0.1876	0.1319	0.2183	0.1764	6.3041
OPM6	0.2222	0.2308	0.2703	0.1876	0.1319	0.2183	0.2102	6.3550
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	λ	6.3691
							CI	0.0738
							RI	1.2400
							CR	0.0595

Appendix 16 Summary of AHP analysis for supplier relationship management

Pairwise comparison matrix

	SRM1	SRM2	SRM3	SRM4
SRM1	1.0000	1.0000	2.0000	0.3300
SRM2	1.0000	1.0000	1.0000	0.5000
SRM3	0.5000	1.0000	1.0000	0.5000
SRM4	3.0000	2.0000	2.0000	1.0000
Total	5.5000	5.0000	6.0000	2.3300

Normalisation matrix

	SRM1	SRM2	SRM3	SRM4	average	consistency
SRM1	0.1818	0.2000	0.3333	0.1416	0.2142	4.1175
SRM2	0.1818	0.2000	0.1667	0.2146	0.1908	4.1228
SRM3	0.0909	0.2000	0.1667	0.2146	0.1680	4.0431
SRM4	0.5455	0.4000	0.3333	0.4292	0.4270	4.1856
Total	1.0000	1.0000	1.0000	1.0000	λ	4.1172
					CI	0.0391
					RI	0.9000
					CR	0.0434

Appendix 17 Summary of AHP analysis for service performance management

Pairwise comparison matrix

	SPM1	SPM2	SPM3	SPM4	SPM5	SPM6
SPM1	1.0000	3.0000	3.0000	5.0000	1.0000	1.0000
SPM2	0.3300	1.0000	5.0000	2.0000	1.0000	0.5000
SPM3	0.3300	0.2000	1.0000	0.5000	0.5000	0.3300
SPM4	0.2000	0.5000	2.0000	1.0000	0.5000	0.5000
SPM5	1.0000	1.0000	2.0000	2.0000	1.0000	1.0000
SPM6	1.0000	2.0000	3.0000	2.0000	1.0000	1.0000
Total	3.8600	7.7000	16.0000	12.5000	5.0000	4.3300

Normalisation matrix

	SPM1	SPM2	SPM3	SPM4	SPM5	SPM6	average	consistency
SPM1	0.2591	0.3896	0.1875	0.4000	0.2000	0.2309	0.2779	6.5597
SPM2	0.0855	0.1299	0.3125	0.1600	0.2000	0.1155	0.1672	6.3113
SPM3	0.0855	0.0260	0.0625	0.0400	0.1000	0.0762	0.0650	6.1258
SPM4	0.0518	0.0649	0.1250	0.0800	0.1000	0.1155	0.0895	6.2427
SPM5	0.2591	0.1299	0.1250	0.1600	0.2000	0.2309	0.1841	6.2698
SPM6	0.2591	0.2597	0.1875	0.1600	0.2000	0.2309	0.2162	6.4143
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	λ	6.3206
							CI	0.0641
							RI	1.2400
							CR	0.0517

Appendix 18 Summary of AHP analysis for information technology management

Pairwise comparison matrix

	ITM1	ITM2	ITM3	ITM4	ITM5	ITM6	ITM7	ITM8
ITM1	1.0000	3.0000	1.0000	2.0000	3.0000	3.0000	1.0000	1.0000
ITM2	0.3300	1.0000	0.5000	2.0000	0.5000	0.5000	1.0000	1.0000
ITM3	1.0000	2.0000	1.0000	2.0000	0.3300	0.3300	1.0000	1.0000
ITM4	0.5000	0.5000	0.5000	1.0000	0.5000	0.5000	1.0000	1.0000
ITM5	0.3300	2.0000	3.0000	2.0000	1.0000	1.0000	1.0000	1.0000
ITM6	0.3300	2.0000	3.0000	2.0000	1.0000	1.0000	0.3300	1.0000
ITM7	1.0000	1.0000	1.0000	1.0000	1.0000	3.0000	1.0000	1.0000
ITM8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total	5.4900	12.5000	11.0000	13.0000	8.3300	10.3300	7.3300	8.0000

Normalisation matrix

	SPM1	SPM2	SPM3	SPM4	SPM5	SPM6	SPM7	SPM8	average	consistency
ITM1	0.1821	0.2400	0.0909	0.1538	0.3601	0.2904	0.1364	0.1250	0.1974	9.0943
ITM2	0.0601	0.0800	0.0455	0.1538	0.0600	0.0484	0.1364	0.1250	0.0887	8.4965
ITM3	0.1821	0.1600	0.0909	0.1538	0.0396	0.0319	0.1364	0.1250	0.1150	8.5731
ITM4	0.0911	0.0400	0.0455	0.0769	0.0600	0.0484	0.1364	0.1250	0.0779	8.5299
ITM5	0.0601	0.1600	0.2727	0.1538	0.1200	0.0968	0.1364	0.1250	0.1406	8.9910
ITM6	0.0601	0.1600	0.2727	0.1538	0.1200	0.0968	0.0450	0.1250	0.1292	9.0718
ITM7	0.1821	0.0800	0.0909	0.0769	0.1200	0.2904	0.1364	0.1250	0.1377	9.1364
ITM8	0.1821	0.0800	0.0909	0.0769	0.1200	0.0968	0.1364	0.1250	0.1135	8.8080
Total	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	λ	8.8376
									CI	0.1197
									RI	1.4100
									CR	0.0849

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