The Factors Impacting on the Management of Global Medical Tourism Service Supply Chain

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***Abstract*—Global medical tourism service (GMTS) supply chain is fast gaining momentum, and relationships between its participants, including patients, are increasingly becoming complex and subject to dynamic change. Medical tourism service in developing countries has emerged as a niche segment of the tourism industry, despite the global economic downturn. The GMTS supply chain is driven by an increasing accessibility of quality healthcare services, and low healthcare costs in developing countries. Many factors such as low cost, government's role, and private investments have contributed to a significant growth in the medical tourism service market in countries such as, Thailand, India, Singapore, Malaysia, Poland, Austria and Saudi Arabia. This article is motivated by the lack of available supply of cost effective, timely and private medical services in developed economies and the need to understand the predictable nature of demand drivers of medical tourism to developing countries. We then, consider conceptualizing cost, waiting time and privacy as important characteristics upstream and downstream the global medical supply chain links. The authors of this article consider that as medical tourism product is similar to a consumer product in supply chain management, to a certain extent, many of the operations objectives found in a manufacturing supply chain can also be readily applicable to the medical tourism supply chain. We propose and test a model that is founded on three supply chain related constructs—cost, waiting time and privacy to inform the demand and also to ensure the smooth flow between the supply chain links for global medical service.**

Keywords-supply-chain; medical services; cost; waiting period; privacy, regression analysis.

I. INTRODUCTION

Medical tourism, where patients travel for alternative therapies, diagnostic treatment, and complex invasive elective and cosmetic surgeries has grown rapidly in the past decade. USA and Europe were the industrial, business and healthcare centers of the world from 1900 to 1997 Asian crisis. The affluent and rich from Asia and the Middle East travelled to these countries in order to receive advanced specialised medical treatment and services. This trend has now reversed since the 1997 Asian financial crisis.

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Medical tourism has been widely acknowledged by academic scholars in this twenty first century [1]–[8]. Like product supply chain, a GMTS supply chain can be considered the network of entities that plan, source, fund, and distribute medical services and manage associated information and finances from manufacturers to medical service delivery points. Factors such as cost, speed (waiting period) and reliability (privacy) are of utmost importance in this kind of supply chain. There are numerous actors and types of relationships involved in making GMTS supply chain work: patients, donors and funders, government policymakers, procurement agents, program managers, regulators, suppliers, distributors, and dispensing staff from the public and private hospitals. Developing economies such as Thailand since 1997 and India since 2003, have been promoting their respective countries as a first world Joint Commission International (JCI) accredited, state-of-the-art medical technology, affordable low cost, no waiting period, health and medical tourism-destinations to the world [9].

The main purpose of this study is to examine through a theoretical model (Figure 1) the predictive relationships between three key GMTS supply chain factors - cost, no waiting period (speed) and privacy (reliability), and the decision to travel to another country for medical treatment. These empirical findings will contribute to this field of the medical tourism service supply chain because the relationship between the proposed key factors and the decision to demand medical tourism has not been previously tested. This empirical study will thus support the literature that members of the GMTS supply chain such as medical tourists are making informed personal healthcare decisions to get the best outcome at an affordable price, with low cost, no waiting period and privacy in treatment.

II. LITERATURE REVIEW

A. Global medical tourism economic outlook

Global growth of the supply chain medical tourism phenomenon is based on two key factors (a) the number of foreign medical tourists travelling (b) the amount of revenue

they generate in terms of foreign exchange [2], [10]. However, it is also important to ensure the smooth flow between the global medical tourism supply chain links such as: (a) marketing, (b) travel arrangement (c) diagnostic (pre-surgery) and medical treatment/surgery (d) post-surgery care and recovery care (e) tourism activities (f) departure and follow-up in the home country (See Appendix 1). According to [11] at the international level, the health and medical tourism industry is sustained by 617 million individuals with an annual growth rate of 3.9% annually and worth US$513 million. Various studies have reported that the global medical tourism industry was worth US$20 billion in 2005 [12] and generates US$60 billion in business globally [13]. The economic impact of medical tourism globally and in the developing countries in particular is significant [2]. For instance According to RNCOS report [12], the total foreign exchange earned through international medical tourism in 2005 by Thailand was US$ 915 million from 100,0000 medical tourists, Singapore US$ 915 million from 350,000 medical tourists, Malaysia US$ 40 million from 400,000 medical tourists, and India US$ 333 million from 180,000 medical tourists [12, pp.13-14]. Further, a total of nearly 1.9 million medical tourists visited Asia in 2005. Medical Tourism is expected to be worth US$ 4.4 billion [14] and globally it is worth US$ 60 billion annually [13] and the market is predicted to grow to $2 billion by 2012 [15].

B. State of the Art

Bookman and Bookman [2] together with Heung, Kucukusta and Song [8], have mentioned the supply and the demand side factors, where a person travels away from home for medical treatment along with the intention of having a leisurely vacation. Smith and Forgione [16] have identified the factors influencing the patient's choice of specific country (economic, political and regulatory) and that choice of international medical facility is impacted by costs, quality of care, physicians training and accreditation in their two-stage model. This model does not determine the demand and supply side factors together with advertising, and other factors affecting the medical tourism industry as a whole. Authors such as Sinha and Kohnke [17] have based their healthcare supply chain model on the widening gap between the growing demand and supply of high-quality, cost-effective, and timely health care, problem faced by all developed and developing countries. They have developed a framework based on the three constructs affordability, access and awareness to understand the demand and inform the supply chain with a macro-centric view of the health care sector, in order to link the development with the delivery of care based on the interdependence between key industries of the health care supply chain. The different models dealing with medical care suggests that in the twenty-first century global medical tourists, primarily from developed countries, are travelling to developing countries for medical care, that is not only non-invasive in nature but also invasive using latest technology and surgical procedures at very affordable costs.

Cost

Global service supply chain companies need to understand both the cost of providing services to their customers and what their customers are willing to pay for the level of service they need. Understanding cost is crucial if competitive service supply chains are to charge their customers the right price for delivering services like medical. Most of the developed countries' medical tourists select a developing country for treatment due to their first world health infrastructure, advantage of English language, availability of alternative therapies like Ayurvedic spas and treatment, low cost and no waiting period [2], [8], [9]. This is a critical supply chain costing strategy as it prompts members of the supply chain to compare two or more alternative supply chains in a geographical area to determine which one gives defined service levels for the lowest cost. As can be seen from table 1, medical tourists essentially compare costs to those in comparable countries for similar service commodities.

TABLE I. COST COMPARISON FOR SELECTED SURGERIES

Countries	Heart By pass	Hip Replace	Knee Replace	Hysterectomy
Australia	$33,340	$23,800	$20,089	$7,113
USA (US$)	$130,000	$43,000	$40,000	$20,000
India (US$)	$9,300	$7,100	$8,500	$6,000
Thailand (US$)	$11,000	$12,000	$10,000	$4,500
Singapore	$16,500	$9,200	$11,100	$6,000
Korea (US$)	$34,150	$11,400	$24,100	$12,700

Source: [32] American Medical Association (2008) and Medi-bank Private (figures from 2006 / 2007 financial year prices)

For example, as seen from table-1, in Australia, a heart bypass surgery can cost up to Aus $ 33,340, which is covered by private health insurance when the surgery is undergone in Australian hospitals. Private health funds do not cover overseas medical cost. While in India's best hospitals it could cost between $9,000 and $10,000. A heart-valve replacement costing US$200,000 or more in America can go for US$10,000 in India including return airfares and a holiday package [32]. In many cases, these cheaper packaged prices include the whole tourism supply chain: airfares, accommodation and even sightseeing and tour services to and from airport, taking care of everything from the time of arrival to departure. According to Thakkar [33], many Americans are traveling abroad for medical treatment as they are either under insured or have no medical health insurance cover, besides many expatriates from Malaysia,

India are also having medical treatment in their country of birth besides meeting family members. Given the cost comparisons of medical surgery between countries as well as the more increasingly available information regarding accreditation of medical facilities, it is becoming easy and affordable for patients from developed countries such as USA, to judge and compare the standards of medical care and cost, and make decisions about travelling abroad to Thailand, India or Mexico for medical treatment, as seen in table 3 [33], where a bypass surgery cost US $8500 in India compared to US $144,000 in USA and hip-replacement cost US $50,000 in USA compared to US $8000 in India and US$ 14,000 in Thailand. Thus in 2007, nearly 750,000 Americans travelled abroad for elective medical treatment which was affordable, at low cost and quicker medical treatment with no waiting period.

Hypothesis 1: Low medical treatment cost will influence the demand for medical tourism.

Waiting Time

Value, in the context of health service supply chain, can be defined as something that the customer is willing to pay for. Value-adding activities transform materials and information into something a customer wants. Non-value-adding activities consume resources and do not directly contribute to the end result desired by the customer. Long waiting periods, therefore, is defined as anything that does not add value from the customer's perspective. Waiting time from point of referral to actual treatment for elective surgery and other complex surgeries in developed country is an important issue [18]. According to OECD report by Hurst & Siciliani [19], waiting time for elective surgery may vary from country to country in terms of the definition of waiting period and aggregation method. For their study they have defined waiting time in two ways. (1) "waiting time between specialist assessment and (2) the time the patient is admitted for surgery" ('inpatient' waiting time). A study by Carroll, et al. [20], found that the longest waiting times for all four procedures were reported in the United Kingdom, Sweden and Canada, with some waiting times for elective procedures > 9 months. Another study by Seddon and French et al. [21] also found that waiting time for coronary artery bypass surgery was longer in New Zealand then in Ontario Canada due to funding constraints.

Hypothesis 2: No waiting period for an elective medical treatment, will significantly increase the demand for medical tourism.

Privacy

The members of the medical service supply chain need to develop trust in order to use services over the time. Trust is a critical element that enables medical service supply chain to keep the confidentiality of what medical tourist consider private information. There are many dimensions to the notion of "privacy" convenience of medical treatment confidentiality of medical record, condition and treatment to avoid embarrassment, and control of personal health Information. Larry [22] puts emphasis on guarding patient privacy and confidentiality of information in the age of information systems. Privacy involves many issues such as desire for privacy of private information regarding travel abroad for medical treatment, type of medical treatment, individual health information [13], [23]-[25].

According to Little [26], there are three key reasons why privacy is important. a) The patient has control over diagnostic test results, procedures and treatments done abroad, at his or hers own expense. b) Part of a "boutique" medical experience is recuperating – away from home business where the medical patient has complete anonymity. c) Finally, women may be prone to discuss about their cosmetic surgeries, however, men are more inclined to value their privacy about medical/cosmetic procedures done abroad while on a vacation or a business trip.

Privacy of medical treatment in terms of security and confidentiality is very important for medical tourists coming from Arab and East European countries to Germany for high quality medical treatment, combining it with a holiday with family in a beautiful natural location [27]. "The most popular treatments requested by Arab patients are plastic surgery, physical therapy and treatment of heart disease, infertility and orthopaedic problems. While the patients of cosmetic medicine are looking primarily for privacy and high quality in small private clinics and medical resorts, the cardiology and gynecology patients are mainly to be found in the huge medical enters attached to medical faculties and colleges in big cities" [27, p.22]. Third hypothesis is related to privacy of treatment abroad in terms of pre and post operative offshore care followed by a vacation if the surgeon permits people to travel for medical treatment due to privacy

Hypothesis 3: Privacy of medical treatment will increase the demand for medical tourism.

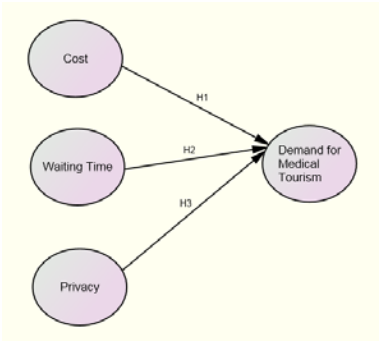

Figure 1. Factors impacting on the GMTS supply chain

III. RESEARCH METHODS

The hypothesized model (Figure 1) was tested using multiple regression analysis. Multiple regression analysis was used to analyse if there is a predictive relationship between one independent variable and a criterion, dependent variable [28]. Stepwise multiple regressions were performed to predict the relative contribution of cost, waiting time and privacy on the dependent variable decision to travel overseas to undertake medical treatment. Hair et al. [29] stated that multiple regression analysis provides a means of objectively assessing the magnitude and direction of each predictor's relationship to its dependent variable.

The study was designed to quantitatively test three key hypotheses (cost, waiting time and privacy) and therefore data were collected using self-administered online surveys. The survey was administered via telephone to a general population of potential regional Australia citizens. The interviewing was conducted over a period of 4 weeks in 2010. Interviews were conducted between the hours of 10:30 am to 2:30 pm and 4:30 pm to 8:30 pm, Monday through to Friday and between the hours of 11:30 am and 4:00 pm on Saturday and Sunday. If the interviewers were unsuccessful in establishing contact on their first call, a minimum of five call-back attempts was made. Upon making contact, interviewers identified themselves and then asked the screening questions for selecting the respondent. The average interview length was 29 minutes.

The total research sample (N=1273) consisted of respondents represented by Australia-born (88.7 %) and Non-Australian (11.3 %), reasonably well educated (44.5 % post-secondary, 55.5 % high school/vocational education). About 62.5 % were employed, almost 30 % were pensioners, approximately 41.8 % of the respondents have an annual income of more than $ 52,000, and about 69.7 of the participants were married.

The surveys assessed relationships between different factors influencing the decision to travel abroad for medical treatment. The scales used for this study's variables were adapted for this study. Some items in the privacy scale measured perception of convenience, anonymity, and confidentiality of medical procedures and services. The final survey comprised Likert-scale items, and nine demographic items. The Cronbach's Alpha for the cost scale in the current study was 0.757, 0.86 for the waiting time scale, for 0.962 for the privacy scale and 0.812 for the demand for medical tourism scale.

IV. FINDINGS

Hypotheses one, two, and three put forward in the literature review were tested using stepwise models which were generated at the $p<0.05$ level. The results for each proposition are exhibited in Table 1

Hypothesis 1: Low surgical cost and affordability will increase the demand for medical tourism.

TABLE II. REGRESSION ESTIMATE OF COST, WAITING TIME AND PRIVACY ON MEDICAL TOURISM

Independent Variable	Dependent Variable	R square	R square change	Standardised coefficient (ß)	Sig.
Cost	Decision to travel for medical treatment	.252	.252	.322	0.00
Waiting Time		.286	.034	.437	0.00
Privacy		.306	.020	.248	0.00

The first hypothesis examines the direct influence that cost exerts on the demand for medical tourism and was supported by the findings. Linear regression results indicate strong support based on the value of ß (Table 1). As per Table 1, cost is a significant predictor of demand for medical tourism ($p<.05$). The results indicated that low surgical cost alone accounted for 25.2 percent of the variance (R square) in demand for medical tourism. A value of ß = .32, R^2 =.25, $F(3, 426) = 60.12$, $p <.001$ for the predictor cost means that there is a direct relationship between cost and demand for medical tourism such that the greater the importance placed on low surgical cost the higher the chances an individual will demand medical tourism.

Hypothesis 2: No waiting period for an elective surgery, will significantly increase the demand for medical tourism.

The second hypothesis examines the direct influence that no waiting period exerts on the demand for medical tourism and was supported by the findings. Linear regression results indicate strong support based on the value of ß (Table 1). As per Table 1, no waiting period is a significant predictor of demand for medical tourism ($p<.05$). The results indicated that no waiting period accounted for 28.6 percent of the variance (R square) in demand for medical tourism. A value of ß = .43, R^2 =.24, $F(3, 426) = 27.85$, $p <.001$ for the predictor no waiting means that there is a direct relationship between no waiting and demand for medical tourism such that the greater the importance placed on no waiting time the higher the chances an individual will demand medical tourism.

Similarly, the positive coefficient associated with the privacy variable shows that the greater the importance placed on privacy the higher the chances an individual will make the decision to travel for medical treatment and demand medical tourism, (ß = .14), $F(3, 426) = 9.61$, $p<.001$. This supports hypothesis 3 which states:

Hypothesis 3: Privacy of treatment will increase the demand for medical tourism.

V. CONCLUSIONS

This research provides insights into the importance of three key service supply chain factors (cost, waiting period and privacy) in the process of making a decision to travel abroad for medical treatment thus impacting on the GMTS supply chain. Therefore, in addressing hypothesis one, it is important to indicate that surgical cost comparisons between

the patient's country of residency and overseas country is vital in terms of affordability of medical treatment and decision to undertake this type of treatments overseas. These findings are in line with much of the emerging literature that is based on the growth of medical tourism industry in developing countries [1], [2], [7], [6], [30], [31] - [33].

This should prompt the government to continue introducing incentives such as expediting medical tourism visas, lowering import duties on medical equipments, increasing depreciation rates to allow the early replacement of old medical equipment and subsidies rates for prime lands to be developed for medical tourism purposes. Likewise, the government should bear in mind that although maximising profits is the key goal of any supply chain, the focus should be on implementing advanced medical technologies and expanding health programs for those who are unable to pay.

The research, in addressing hypothesis two which suggest that no waiting period for an elective surgery, will significantly increase the demand for medical tourism, is consistent with the literature [3], [13], [18], [23], [24]. It is a challenge for medical system in Western countries to reduce the waiting time for seeing a specialist and elective surgery. Thus, Hurst & Siciliani [19], further note that according to Organisation of Economic Cooperation and development (OECD) waiting time is used for rationing given the shortage of skilled surgeons/specialists to restrict access to medical care in countries having public provision, that is government supply chain management of health care and universal health insurance these further results in pain and poor health for the patient in the long-run and may reduce longevity and quality of life. As longer the waiting time for elective surgery, from the time of being diagnosed, the patient may suffer with pain and the medical problem can get worse. For example tumour or the hip can get worse with deteriorating health and overall quality of life for the patient. Thus medical tourists are making decisions based not only on the cost and affordability of the treatment, but also shorter or no waiting time for surgery, to reduce their incidence of physical pain and get surgery on time to improve their health by travelling to another country.

This is a clear message to developing nations such as India who should continue increasing the physician's density per 1,000,000 of population by implement policies to decrease the rate of migration of medical practitioners to more developed countries. Likewise government should work with JCI accredited hospitals to provide salary incentives to attract resident as well as non-resident Indian (NRI) nationals who are medically trained overseas. Further, private hospitals should provide for greater capacity of hospital beds to serve its domestic population to promote equitable access. This indicates that healthcare equity in the local populations of India or Thailand effectively copes with increasing flows of foreigners seeking medical treatment. It also may be an indication that these countries are not yet reaching capacity limits hence other countries cannot capitalize on its medical tourist overflows.

Hypothesis three suggests that privacy of treatment will increase the demand for medical tourism which is consistent with the literature [3], [23]-[25]. Patients thus choose to travel to another country for medical procedure which could be private in nature such as cosmetic surgery, gender selection, drug rehabilitation treatment, gender change, for protecting their confidentiality and privacy of treatment, along with the opportunity to travel. Medical tourism service providers, hospital and medical tour operators, and hotels are prompted from the business sustainability point of view to protect and guarantee patient privacy and confidentiality. This involves privacy regarding medical treatment, reports, travel and accommodation plans and having an international patient privacy policy to build confidence of the patient in their service provision. Likewise this might include issues related to sensitivity to cultural differences. For example International Halal Integrity Alliance, (Malaysia) and Islamic Chamber of Commerce and Industry (Kingdom of Saudi Arabia) has certified the Global Health City in Chennai, India in June 2012, which provides 'halal friendly' medical tourism services [34].

Given the globalisation of healthcare where the world is soon to become our hospital catering to complex surgical procedures due to the low costs, privacy, short waiting period, there is a need for developing sustainable GMTS supply chain to provide first world quality of medical care.

TABLE III. COST COMPARISON FOR SELECTED SURGERIES ($US)

Surgery	**USA**	**Cost-Rica**	**India**	**Mexico**	**Singpore**	**Thailand**
Heart bypass	144,000	25,000	8,500	20,000	13,500	24,000
Angioplasty	57,000	13,000	8,500	16,000	7,500	7,000
Heart valve replacement	170,00	30,000	1,200	30,000	13,500	22,000
Hip replacement	50,000	12,500	8,000	13, 125	11,100	14,000
Knee replacement	50,000	11,500	7,000	10, 660	10.800	12,000
Dental Implants	2,000-10,000	1,000	700	910	2,900	3,000
Breast Implants	10,000	3,500	4,500	8,000	5,400	3,700

Source: [33] American Medical Tourism Association (2009 prices)
Note: Prices do not include the cost of airfares, food and accommodation in the destination country and hospitals.

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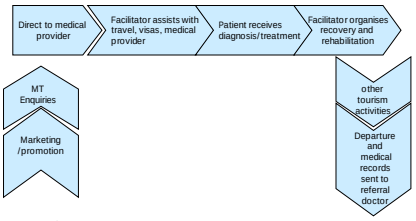
APPENDIX 1. GLOBAL MEDICAL TOURISM SUPPLY CHAIN LINKS



Source: Developed for this research

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