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Hee Sung Yoon

*Sogang University*, yhs5156@naver.com

Sung Woock Cho

*Sogang University*, sungwcho@hanmail.com

Vijayan Sugumaran

*Sogang University*, sugumara@oakland.edu

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# **A Service System Design to Support Medical Tourism in South Korea**

Hee sung Yoon, Sung woock Cho, Vijayan Sugumaran  
Sogang University  
yhs5156@naver.com, sungwcho@hanmail.com, sugumara@oakland.edu

## ***Abstract***

Healthcare costs are continuously increasing due to longer life expectancy and providing global healthcare services through medical tourism is not a new trend anymore. Several countries have well established programs and infrastructure dedicated to medical tourism. South Korea is attempting to become a major player in this domain by undertaking broad initiatives. The success of medical tourism is greatly impacted by easy access to two types of information, namely, medical and travel information. The National Health Insurance System in Korea collects huge amount of clinical and financial information from all hospitals. However, this information does not get used effectively in health and travel information systems to support medical tourism. In this paper, we develop a medical tourism service system that will promote information exchange and service delivery.

## ***Keywords***

Medical tourism; health service system; decision support; service system design; Korean medical tourism web portal

## **1. Introduction**

Rising health care costs and longer waiting times in the western countries like United States, Canada, and UK are inducing patients to seek treatment overseas (Connell 2005; Carabello 2008). While U.S. consumers are concerned mainly with the exorbitant cost of health care, Canadians are more troubled by wait-times for certain treatments. Indeed, approximately one million Canadians claim to be experiencing difficulties in gaining access to care. As for UK, it is believed that more than 50,000 people travel for treatment abroad because of high medical care costs in the UK. According to a report from 'McKinsey and Company,' global medical markets would increase from 40 billion in 2004 to 100 billion in 2012 and the number of global medical tourists from 19 million to 40 million.

Korea is a latecomer to the medical tourism business. The world's 14th largest economy, however, appears to have all the competitive edge over its rival Asian medical tourist destinations (Sohn 2009). Virtually everyone in Korea is covered by the national health insurance scheme. Medical fees have been strictly controlled by the government and remain at a fraction of the prices in the United States and even cheaper than those in China and Singapore. As the country developed into an IT powerhouse with an abundance of highly skilled labor, its medical technology has rapidly evolved to match the level of the state-of-art technology it exports all around the world (Kim & Kim 2008).

The losses in tourism and trade in Korea during 2007 exceeded \$10 billion, as shown in Table 1a below. Increase in inbound tourists and development of strategic industries to foster higher value-added sector is required to solve the tourism deficit. Tourists coming for medical treatments have a tendency to stay longer and spend more money; therefore, medical tourism should continue to be intensively fostered as a strategic industry (Hunter 2007). The government has projected the economic effects of the health services in medical tourism for five years from now, expecting to attract 80 thousand medical tourists in 2011 and 100 thousand medical tourists in 2012, and the profit from treatments is expected to be on average \$22 million every year. The following table (Table 1b and Table 1c) shows the projections for the next year.

<b>Table 1a. Travel service &amp; medical service income</b>							
	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	
Inbound	4,752,762	5,818,138	6,022,752	6,155,047	6,448,240	6,890,841	
Outbound	7,086,133	8,825,585	10,080,143	11,609,878	13,324,997	11,996,094	
Travel Income	5,343.40	6,053.10	5,793.00	5,759.80	5,750.10	9,020	
Travel Expense	8,248.10	9,856.40	12,025.00	14,335.90	15,879.50	12,640	
Tour Net Income	-2,904.70	-3,803.30	-6,232	-5,876.10	-10,129.50	-3,620	
Medical Service Income	-	-	-	-60	-71.5	-50	
<b>Table 1b. Expected economic impact on medical market</b>							
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>	<b>Average</b>
Number of Patient	27,500	50,000	60000	80000	100000	300,000	60,000
Medical Income	74,739	149,478	224217	298956	373695	1,121,085	224,217
Economic induce effect	131,092	262,184	393,277	524,369	655,461	1,966,383	393,277
(Million in won)							
Job Creation	303	1,465	1,465	1,465	1,465	6,162	1,232
<b>Table 1c. Expected economic impact on tourism market</b>							
	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>Total</b>	<b>Average</b>
Patients	27,500	50,000	60,000	80,000	100,000	300,000	60,000
Travel Income	27,645	55,290	82,936	11,058	138,226	414,678	82,936
Economy induce effect (Million in Won)	77,404	154,808	232,211	309,615	387,019	1,161,060	232,212
Job creation	835	1,670	2,505	3,340	4,174	12,523	2,505

**Table 1: Expected economic impact on medical & tourism market**  
Source: 2008 data from Health, Welfare and Family Affairs (Yoo 2009)

Medical tourism is in its infancy in Korea, however, it is expected to generate 80 million dollars in the next five years. It not only brings foreign currency but also creates linkages between the healthcare and tourism industries (Bloom & Standing 2008). By way of multiplier, medical tourism spills into secondary and tertiary sectors, producing cyclical waves of expansion (Lim 2009; York 2008). Since medical tourism is regarded as the next potential growth engine, Korea

is keen on creating a national brand and developing the necessary medical technologies. The Korean government is supporting the nation's medical tourism industry in the hopes of securing the country's future as a key destination for patients seeking treatment abroad (Bae 2009).

There are some challenges faced by the Korean medical tourism industry. One problem is the lack of business models and also making the relevant medical information available to potential customers and promoters in a secure manner. There is no comprehensive system that can help potential customers generate different options based on their medical needs and compare them in order to make a final decision. Similarly, there is no single system that the service providers can use to make information related to their capabilities and competencies available to customers and coordinate their services. Thus, the objective of this research is to design a central service system that can support the medical tourism initiative in Korea. This system would address the needs of all the stakeholders involved, namely, customers, service providers and governmental agencies.

The remainder of the paper is organized as follows. Section 2 outlines some of the related work. Following that, section 3 discusses the proposed solution which consists of a three stage process model. Section 4 identifies the requirements for the medical tourism service system. Section 5 discusses the design of a system and the services it provides to support medical tourism and section 6 concludes the paper.

## **2. Background**

In order for medical tourism to flourish, there has to be close cooperation between the healthcare and tourism industry and the appropriate governmental agencies that oversee them. According to previous research (Leng 2007), different strategies can be used for improving this linkage. For ensuring the quality of service, the state can manage a quality assurance program and provide tax incentives for active participation. Another important factor is targeting the right demographics. Leng (2007) discusses the growth of medical tourism in Malaysia and points out that the government has played a key role in establishing the medical tourism industry in Malaysia. Similarly, Singapore and Thai governments have played a dominant role in developing, regulating and promoting medical tourism in their respective countries (Kim 2003).

Potential medical tourists need tools to help them evaluate options in a systematic manner. Smith and Forgione (2007) have developed a decision model to help clients select a specific service provider based on several factors. Their decision model consists of two major factors, namely, the country and medical facility, and there are several sub-factors such as such economic conditions, political climate, regulatory standards, costs, accreditation, quality of care, and physician training. While this model takes into account some of the important factors, it does not include enough information about the customer decision factors. In our work, we have tried to include additional customer related factors that need to be considered in the decision making process.

Singapore makes world headlines for performing complex neurosurgical procedures and delivering cutting-edge medical treatment by the region's leading health specialists. Its reputation for high quality medical facilities and well-trained doctors pulled in more than 370,000 visitors in 2004 (Connell 2005). India promotes its private healthcare sector as a tourist attraction, providing first-class service at a third-world price. The Escorts Heart Institute and Research Centre in New

Delhi boasts a death rate for coronary bypass patients of only 0.8 per cent. Unlike Korea, in most countries, private hospitals play an important role in medical tourism.

Medical tourism is a chain of various services and it needs a service chain system from start to end. This is discussed in the next section. The main difference between medical tourism and traditional tourism is the variety. Each customer might have different schedule, location and procedure. Most of the services might be personalized. Also, each service provider is a separate business competitor. However, to gain synergy, they have to work together, which is not easy.

According to 'Korea Health Industry Development Institute,' lack of information is a key reason for weak medical tourism in Korea (Kim 2010). Hence, there is a great need for a comprehensive information system that potential customers can use to identify various options and make informed decisions. In this paper we propose an integrated information system for medical tourism that utilizes the highly developed national health insurance system and the IT infrastructure in Korea.

### **3. Proposed Solution**

Medical tourism consists of several services: medical service, travel service, financial, and legal. In this paper we develop a design for the service management system that has an impact on customers and support their decision making process. This service system supports two stages in the entire process; namely, the "back stage" and the "front stage." In the back stage, government bodies facilitate the gathering and the assessment of information from hospitals and travel organizations that can be used in the service selection.

In the front stage, we categorize the services that need to be provided to customers into three phases: pre-service phase, service-delivery phase, and post-service phase. Each phase requires a large amount of important information that should be easily accessible to help the customer go through the decision process. Of course, additional information might be needed for specific cases, which should also be provided when needed.

A travel agency could provide some useful information for the customers who want a medical tour in general, but it would not be enough to meet customer's specific needs. Particularly, in medical tourism, customers are interested in the assessment of hospital's quality of care and physicians reputation. There are organizations such as Joint Commission International (JCI), which measure clinics' quality of care, safety, etc. Several hospitals are certified by JCI, but not every clinic is certified; hence it would be important for patients to seek out these certified hospitals or clinics, or other hospitals where corresponding advantages are offered. Such information should be made available to potential customers.

The following two sub sections briefly describe the back stage and the front stage of the proposed solution. In particular, the processes, required data, and the communication between various entities are discussed.

### **3.1 Back Stage**

The back stage deals with setting up the necessary infrastructure for information sharing to support medical tourism and consists of two major processes: a) data gathering, and b) service quality assessment. The major stakeholders relevant for this stage and the communications between them are depicted in Figure 1. The data gathering process facilitates the collection and aggregation of relevant data on an on-going basis from all the appropriate sources both from the medical as well as the tourism community. From the medical domain, the participating hospitals and clinics have to provide the necessary information such as physician information, reputation, procedures offered, number of patients, cost, location, technologies used, privacy rules, etc. Similarly, from the tourism domain, information about hotels, transportation, finance, food, entertainment, shopping, immigration, etc. have to be gathered. All of this information has to be consolidated and made available to the foreign patients and doctors through a medical portal. The Medical Coordinator acts as the intermediary between the medical and the tourism communities and ensures that the foreign patients and the doctors get the right information at the right time. International patients can bring huge amount of financial benefit to Korean Hospitals or medical tour related businesses. However, there are numerous problems, such as fuzzy boundary between western and oriental medicine, mismanagement in clinics and malpractice. Many private clinics are not able to participate in medical tourism due to lack of coordination and communication.

The service quality assessment process provides the oversight function and ensures that the services provided meet certain standards. Malpractice can cause international disputes and create lots of problems. Similar to other medical tourism countries, Korean government may be required to intervene. The classification of physicians and healthcare organization has to adhere to strict regulations. The healthcare organizations which want to participate in medical tourism need to register their departments and physicians; not every department is automatically approved to treat international patients. The Korea Tourism Organization, a major stakeholder in our system, has a huge network with many travel organizations. The system we suggest would be controlled by the government and would increase the level of service quality and provide certain basic guarantees.

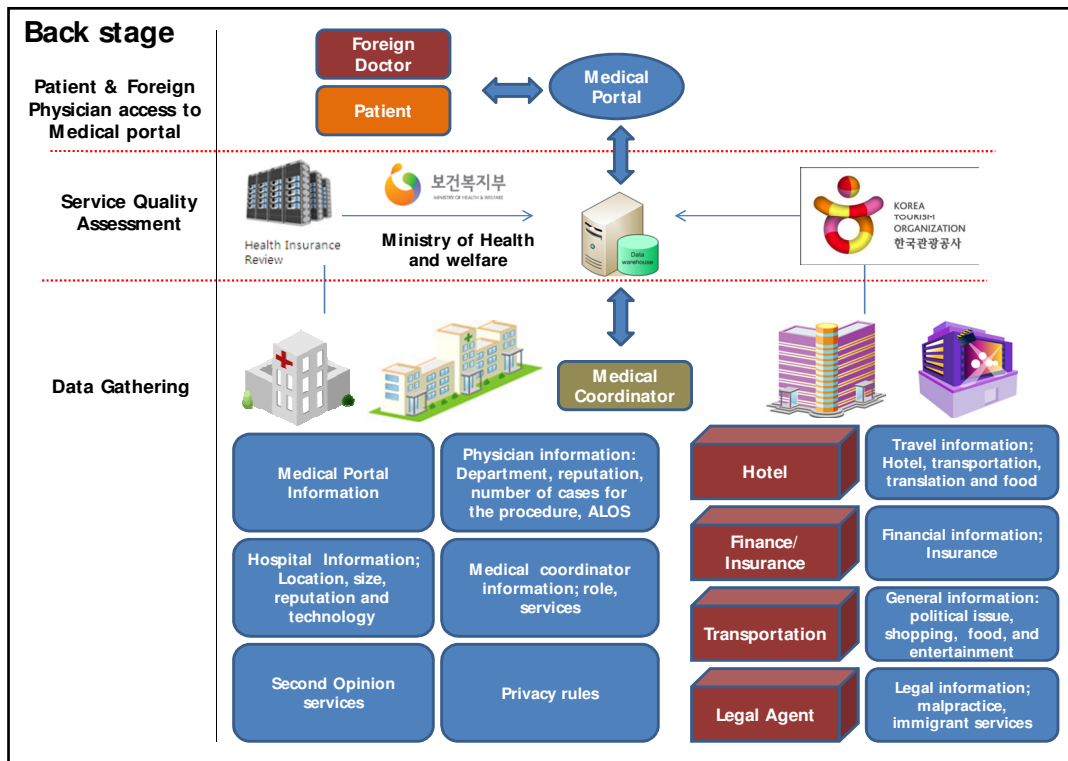
### **3.2 Front Stage**

The front stage is customer facing and focuses on the necessary processes required to help the customers during service selection, service delivery and post service care. The front stage includes three phases, namely, pre-service phase, service-delivery phase, and post-service phase. The pre-service phase supports the medical tourism decision making process undertaken by the consumers in selecting a particular hospital or doctors to get medical care and planning the trip. The service-delivery phase includes processes for getting the actual medical care and the post-service phase deals with recovery and follow-up care. Each of these phases is briefly described below along with the information needs for each phase.

#### *3.2.1 Pre-Service Phase*

The first phase in the front stage is the pre service phase which involves the decision making process. The potential customers for medical tourism want to obtain and review as much information as possible before they make their decision and hence, this stage is referred to as “Pre service stage.” During this phase, a customer collects and compares information to make decision

on the medical travel, as shown in Figure 2. As mentioned earlier, Smith and Forgione have suggested a model regarding the major factors that influence a customer in selecting the foreign country and medical facility (Smith & Forgione 2007). Economic conditions, political climate, and regulatory standards are some of the factors generally considered in choosing a country. Cost, accreditation, quality of care, and physician training are also considered in choosing a medical facility. A critical issue is, how can a lay person judge foreign hospitals and physicians and the quality of their training? We need to help the customers in this regard and provide the necessary information and interpret the indicators. We propose the use of a “medical coordinator” can do this job for customers. We describe the role of Medical coordinators in a later section in the paper.



**Figure 1:** Back Stage System Design

The pre-service phase includes three major tasks, as shown in Figure 2. Task 1 is comparing and selecting the hospital, physician and the location. Task 2 is requesting a second opinion and task 3 is making the final decision. The medical or clinical data is provided by the foreign doctor and the patient can send their personal and medical information through the medical portal to get a ‘Second opinion’. In this process, security is an important issue for patients. The counterpart doctor working in Korea is authorized to access the medical portal and review the patient information and upload the second opinion in the system. Based on the second opinion, the patient can make the final decision to travel for the treatment and can get information related to the travel and housing services. Patients and local doctors can get most of information through the “Medical portal”. Based on the patient request and information, a medical coordinator can provide an estimate for the patient and also translate documents that are in the patient’s language. The

medical coordinator would be assigned by each hospital and would be given an ID and password to access the medical portal. Because of the confidentiality of patient information, each user has different levels of access to patient information. For example, the medical coordinator could not access clinical information or change patient data.

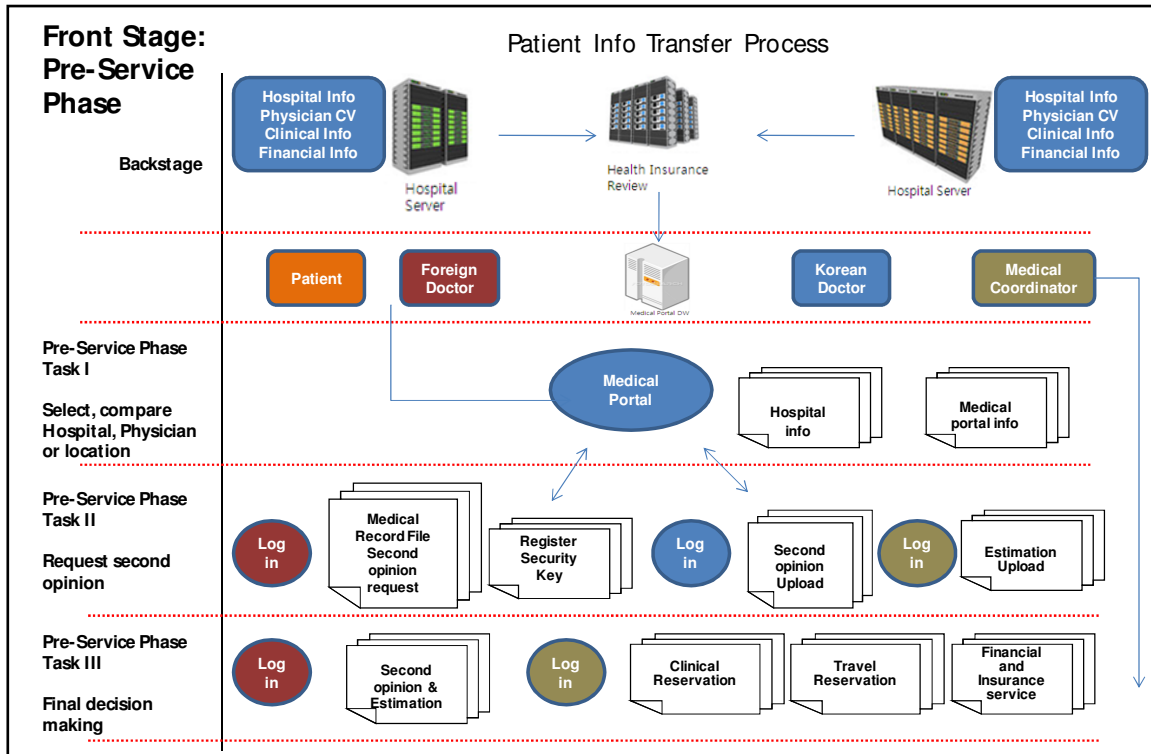


Figure 2: Pre-Service Phase System Design

### 3.2.2 Service-Delivery Phase

After the decisions have been made, customers take actions in terms of making the reservations for travel as well as the specific services they want to receive. Then they travel to the destination to receive the medical care they are seeking and the service provider delivers the treatment and takes care of the patient throughout the stay. Hence, this stage of the process model is referred to as the service-delivery phase. In order for this phase to be successful, all service systems should be connected together and deliver the necessary services in a seamless manner. Hospitals need to schedule the necessary treatments based on the available beds and dates for specific doctors. Hotels and transportation outfits need to coordinate the movement of the patients to appropriate locations based on the availability of facilities. In this phase, the medical coordinators need to make appropriate schedule for customers and every service should follow this schedule from arriving at the airport to the final departure, as shown in Figure 3.

### 3.2.3 Post-Service Phase

Finally, the post service phase (Figure 3) provides financial service, legal service and follow-up care to the customers and service providers. In Korea, patients pay in advance for all services and then get the medical procedures done. However, for foreigners, a deferred payment system should be introduced. Medical tourism has several benefits such as low cost and comparatively high



quality; but there are also some pitfalls such as possibility of malpractice, difficulty in communication, and could be time consuming. What should one do first when there is something that goes wrong in their travel or procedure? Do they need to contact a local lawyer or a foreign lawyer? The post-service phase deals with such issues and provides the necessary service on a case by case basis. The follow through of patients even after they go back to their native countries is essential for the success of the medical tourism because they become the new ambassadors of the program and encourage their friends and relatives.

#### **4. Requirements for the Korean Medical Tourism Service System**

The medical tourism system should be designed to help all the stakeholders involved, namely, the service providers, the service consumers, and the governmental agencies. Such a system should support the role of each of the service providers to exchange information and organize them in one network. A network system is required to exchange service information among different service providers and also the informational content needs to be verified by the regulatory organization. The Korean Medical Tourism Service System (KMTSS) that we are designing requires several components to provide the necessary services.

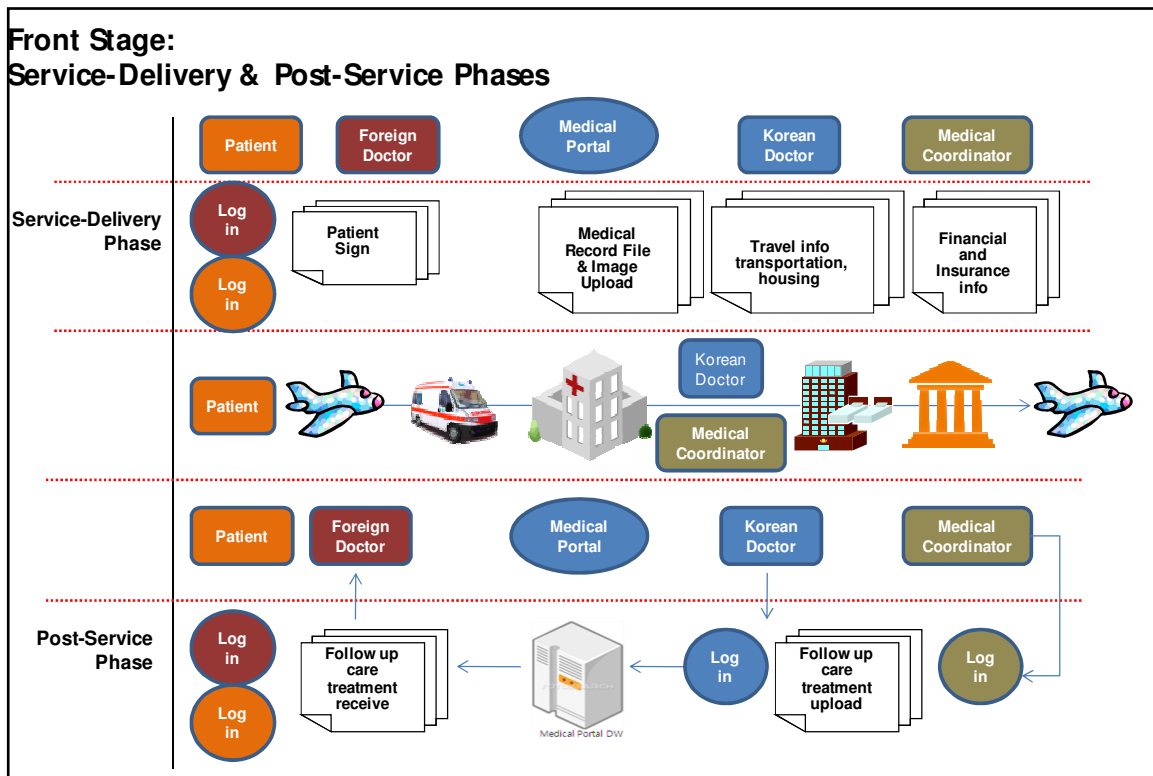
First, a central data warehouse is essential to store all the relevant information needed to support the medical tourism industry. It should include the travel information provided by the travel agencies. For the hospitals, the medical association needs to agree on the range of information that will be made public and also need to get the physicians' consents. With respect to hospitals, the following information will be crucial: clinical, medical information, physician vita, cost of procedures, length of stay, and quality indicators. For travel services, real time information should be shared among service providers.

Second, evaluation standards are also required. To keep the quality high and prevent problems, reasonable standards should exist. These standards should also be actively enforced. Third, the system should be a "one stop shop and one billing system." As discussed earlier, the whole service system should be designed as a total solution system. Finding the relevant information, arranging the services, and billing need to be done in one place and it would help patients and save time and energy.

Some of the other factors that impact the Korean medical tourism and the underlying system infrastructure are mentioned below.

##### *Competitive edge*

Purely tourism based incentive is not sufficient to attract many customers. The strategy must be different compared to other countries. The competitive edge of Korean medical tourism is high medical quality and relatively low price. The target should also be different for different countries.



**Figure 3:** Service-Delivery and Post-Service Phase System Design

#### *Cooperation between all the stakeholders*

Government departments, hospitals and tourism organizations have to cooperate with each other and share information in timely manner so that the medical tourism processes can be executed properly and seamlessly. Thus, the medical tourism system infrastructure must support interoperability between different systems.

#### *Security and privacy issues*

Medical tourism systems need to keep track of three different kinds of information: personal demographic information (age, name, address, etc.), travel information (hotel, hospital, ticket etc.), and medical service information (disease, medicine, medical image, medical record etc.). To protect this private information, a systematic approach is required with several layers of authentication checks and access protocols. Based on the user role, access rights should be set up and strict controls should be enforced.

#### *Medical coordinator*

Medical Coordinators understand and possess knowledge about medical, tourism, and regulatory issues (Lee 2009). In order for medical tourism to flourish, a large network of medical coordinators is required to help customers with their varying needs. There are five roles that medical coordinators have to play: designer, organizer, escort, consultant, and planner. These coordinators have to deal with people and have quick access to relevant information. They are the core players in the entire service system. They design the medical tourism packages, organize services, escort patients, provide consultation and answer questions regarding travel and help customers successfully complete the entire process.

## 5. System Architecture

In this section, we discuss the architecture of the Korea Medical Tourism Service System (KMTSS) and the specific services it provides. This system is designed to support the service chain that is necessary to successfully undertake the medical tourism activity by a customer. Figure 4 shows the major services that would be facilitated by the system and the corresponding modules in the system. The top half of the figure shows the service flow and how the services are linked together and which services are provided at each stage.

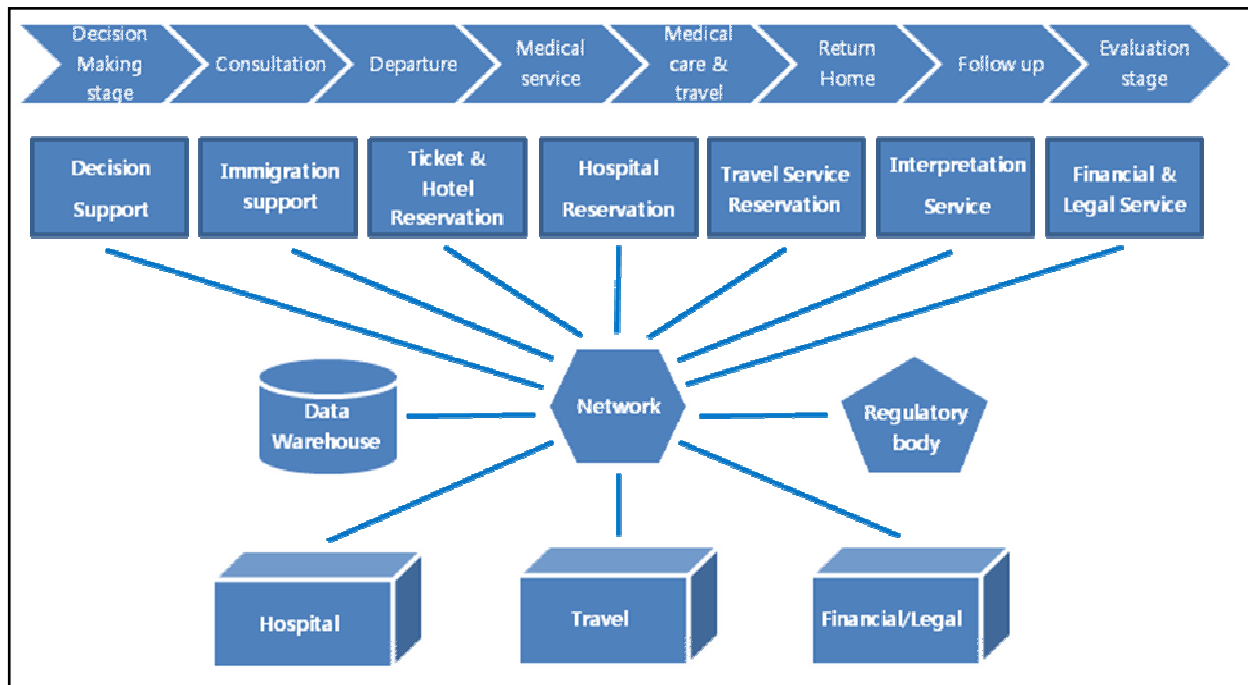
The bottom half of the figure shows the “Hospital” entity that provides all medical information to KMTSS. The information will be stored in a data warehouse and the Regulatory Body evaluates the data constantly. The Health Insurance Review Agency collects and evaluates the medical information in Korea. The Travel Service entity also provides service quality indicators to the system. Sometimes patient’s length of stay can be longer than expected so there needs to be a strong cooperation between service providers. The Financial and Legal Service entity needs to register as an international patient support service and assist the customer with payment options and provide legal counseling if needed. In Korea, typically patients pay first before getting any service. However, for the international patients a deferred payment system should be provided. Another concern is medical malpractice. It could be an important issue in Korea because of the low cost. International lawyers may need to be involved to solve any possible disputes.

Most of the information collected from stakeholders is provided through the decision making support system module. Customers also need to provide his/her personal, medical and required information. Though this network system customers can contact multiple hospitals at once. Customers can get all the estimations and second opinion from multiple hospitals where he/she sent the medical records. Customers can compare length of stay (LOS), reputation, quality, costs and so forth. After making the decision, reservation service would automatically be followed for both hospital and travel services.

The different services that could be obtained through the system are briefly described below.

*Medical*— Through the KMTSS system, patients can get more relevant information and gain confidence about the treatments that are provided. There are several barriers to medical travel, one is time and the other is location. Patients’ considerations would be very complex; they would like to understand how safe it is, whether everything will follow the schedule accurately, and also whether the cost is appropriate. This multi service network can provide personal service to meet the needs of the customers, even if they have very specific requirements and constraints.

*Tourism*— The KMTSS system supports customers by providing all the information about tourism facilities and services which are registered with the government. The approved sites to visit near the location where the customer receives medical care are considered in putting a package together for the patient. Such a carefully coordinated special tour package will help the patient recuperate faster and also gain knowledge about the country and culture. There will also be mechanisms to contact the medical facility in case of emergency or need urgent care.



**Figure 4:** Korea Medical Tourism Service System (KMTSS) Architecture

*Financial and legal*— A single billing system makes it easier to determine how much it costs and explain the details to customers. If there is medical malpractice then this system will provide the medical records and other documents as soon as possible to all the necessary parties and the authorities. To support medical tourists with their finances, we need to introduce a new medical insurance system which can connect with foreign medical insurance companies. In addition, to effectively handle possible medical incidents we need to develop a medical legal service system which includes specialists that have background in medical and tourism services.

*Follow up care*— Some medical treatments require follow up procedures. All the medical records should be provided to local medical doctors who are registered with the KMTSS system as well as the Korean physicians as partners.

The development of the Korean Medical Tourism Service System (KMTSS) is designed to be a total solution. In other words, it will provide an end-to-end solution for the medical tourists visiting Korea. Currently, there is no total solution infrastructure for the medical tourists coming to Korea. The number of medical tourists visiting Korea has shown a rapid increase from 28,000 to 50,000 in the year 2009. Hence, Korea has to greatly improve the medical and tourism related services that are being provided to keep up with the demand.

## 6. Conclusion

Medical tourism could be a great opportunity for Korea. So far, there has not been much investment made in the infrastructure to improve medical tourism, however, the high quality of the entire services and low price is still attractive to foreign patients. Unlike the normal tourism

experience, medical tourism would deeply involve the national brand image. If there is any mistake in any of the procedures then the travel could become a long legal battle.

The KMTSS system is the result of a systematic effort to improve medical tourism in Korea. There are very talented physicians and excellent facilities but there is no centralized system to integrate all the available services. In this paper we have suggested a new model with decision support capabilities to assist medical tourism customers. Similar to other countries, this business model needs to be championed by the government, especially in promoting and marketing the medical services. The KMTSS system would provide the necessary information and interoperability needed to make medical tourism a great success in Korea.

### ***Acknowledgement***

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