

Cord Blood Banking – Opening New Vistas for Medical Tourism Industry in India

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Abstract

Medical tourism in India –growing at the rate of 30% annually-has established edge in surgical treatments. Banking of “Cord Blood” –a rich source of stem cells & a critical input for such surgical treatments-is also undergoing a boom with world’s largest Cord Blood Bank being established in Mumbai. Further, stem cell research indicates the potential use Cord Blood for the treatment of widespread diseases like diabetes, BP, heart stroke.....etc. Against this backdrop, can cord blood banking usher in new vistas for India’s Medical Tourism industry? What are the pros & cons of Cord Blood banking in India, especially with respect to India’s medical tourism industry? Given the current edge in surgical treatments, can India capitalize on the upcoming boom in cord blood banking?

This paper explores the potential for possible synergies between two happening sectors of India-medical tourism & cord blood banking – and suggests strategic measures for the preferred scenario with respect to various stakeholders.

To analyze the current status and trends in Medical Tourism and Cord Blood banking sector in India, SAP-LAP (Situation, Actors, Process-Learning, Action, and Performance) framework is used.. Further, to outline the future scenarios of possible synergies between India’s edge in Surgical Treatment & Cord Blood Banking, Scenario Building technique has been used.

Keywords: *Medical tourism, cord blood bank, surgical treatment, scenario.*

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1. Introduction

'Medical Tourism' refers to patients going to a different country for an either urgent or elective medical procedure is fast becoming a worldwide, multibillion-dollar industry. Global medical tourism is \$20 billion and is expected to double by 2010.(Woodman, 2007). In India 'medical tourism' is growing at the rate of 30% a year and is expected to generate revenues of Rs.100 billion by 2012 as per the study conducted by CII and McKinsey.(CBC News,2004)

With number of medical tourists growing at the rate of 15% annually (Oxford Analytica), India is currently a hot medical tourism hub. State of the art equipment, technological advances, qualified medical professionals, personalized patient care and a blend of modern and traditional medicine has put India on the global medical tourism map.

Trends indicate that, due to sky rocketing health care costs and insurance premiums which is beyond the reach of low and middle class income people in the advanced countries, patients from the western world have started seeking life saving treatment/surgeries in low wage countries especially India. New England Journal of medicine calls this new breed of growing patients as '*Medical Refugees*'. They use low cost destinations like India for life saving surgeries.(Milstein & Smith, 2006) Thus, with established edge in surgical treatments, India is poised to play an important role in one of the world's fastest growing industry of 'medical tourism'.

On the other hand, cord blood i.e. blood remaining in the umbilical cord ,donated by mothers after the birth of their children-has been accepted worldwide as rich source of stem cells used for transplants(Rubinstein,2006) .Advancement in medical research has established the use of cord blood based stem cells in the treatment of more than 45 diseases (Warrier, 2004), especially in the treatment of deadly diseases like leukemia, lymphoma, etc...Research is also going on for using cord blood to provide low cost effective treatment for widespread diseases like diabetes , heart attack, some form of blindness, etc...(Dastur,2005).

However, with 7000-8000 cord blood transplants performed worldwide since 1993 (Rubinstein,2006), only 20 transplants have been done in India so far.(LifeCell,2005). Out of the 6000 cord blood transplants worldwide only 20 transplants has been done in India so far.(Life Cell- 2005).With transplant success rate in India being 99.6% (www.apollo.com), it may be hypothesized that adequate supply of cord blood may trigger a boom in the medical tourism arena. With this background, this paper shall explore the rich avenues possible for India Inc., with cord blood banking providing the required boost to its growing medical tourism industry.

Extensive literature review has been undertaken to develop an understanding of the domain of medical tourism and cord blood banking in the country. To supplement the secondary data informal discussions with experts from the healthcare and biotech research firms were conducted . To analyze the current status, SAPLAP (Situation, Actors, Process-Learning, Action, and Performance) framework has been used.(Sushil,2001). Further, to present the possible future outcomes in cord blood banking & medical tourism in India, the powerful method of Scenario building technique is used.

2. Cord Blood Banking in India-An Overview

Cord Blood –i.e the blood that remains in the umbilical cord after a baby is born-represents a new and the richest source of stem cells-which is the origin of the body's immune & blood system (Warrier, 2004). With rising interest in stem cell based therapy, the scope of cord blood bank is becoming more of a cell pharmacy.(Querol, 2007). In order to understand the importance and potential of Cord Blood Banking, it is imperative to explore further the emerging applications of stem cells.

2.1 Stem Cells-Emerging Applications

Stem cells are basically the primal cells found in the multi cellular organisms. It has the remarkable potential to develop into many different cell types in the body, serving as a sort of repair system for the body. They are actually master cells because they give rise to all tissues, organs and system in the body. The stem cells ability to differentiate or change into other types of cells in the body is a new discovery that holds tremendous potential for treating and curing some of the most common diseases such as heart diseases, cancer etc.(Wikipedia.org)

There are basically three sources of stem cells; *bone marrow, embryonic cells and cord blood*. A bone marrow based surgical treatment is mostly stringent and is a difficult process as it requires accurate and correct match which is often too tedious. On the other hand the treatment based on embryonic cells involves a lot of controversies as it requires the culture of embryo or waste fetus (Dastur, 2005). The third and the richest source of stem cells is the cord blood. According to Weiss et al (2005), umbilical cord blood contains inexhaustible, non-controversial sources of stem cells for therapy.

Stem cell therapy in the coming decades may provide solutions to incurable ailments and severe injuries. Diseases like leukemia, metabolic disorders and immune deficiencies etc have been successfully treated with umbilical cord blood transplantation (McGuckin et al, 2007). Further stem cell breakthrough is expected to promote effective low cost treatment for diseases like diabetes, stroke, spinal cord damage etc...(Dastur, 2005). The Indian Council of Medical Research has estimated that some 50 million patients with heart disease, 5 million with Parkinson's disease and 5 million with Alzheimer's disease in India are 'potential beneficiaries' of stem cell therapy.(The Hindu, July 15,2005) First-generation therapy is already being offered in South Korea for spinal injuries .Some of the current and emerging applications of cord blood based stem cells have been listed in Table-1,below .

Table-1-Applications of Stem Cells

Current Applications of Stem Cells/Cord blood	Emerging Stem Cell /Cord blood Applications
<i>Acute Leukemias</i> <i>Chronic Leukemias</i> <i>Thalassemia</i> <i>Fanconi's Anemia</i> <i>Sickle Cell Anemia</i> <i>Hodgkin's Lymphoma</i> <i>Non-Hodgkin's Lymphoma</i> <i>Multiple Myeloma</i> <i>Others</i>	<i>Cardiac Disease</i> <i>Diabetes</i> <i>Multiple Sclerosis</i> <i>Muscular Dystrophy</i> <i>Parkinson's Disease</i> <i>Spinal Cord Injury</i> <i>Stroke</i> <i>Alzheimer's Disease</i> <i>Lupus,Rheumatoid Arthritis</i>

Source: Wikipedia.org

2.2 Cord Blood-the richest source of Stem Cells

Cord blood is the blood that remains in the baby's umbilical cord after it has been cut and is a rich source of stem cells. Earlier treated as a waste to be discarded after birth, cord blood is now considered a precious resource. Although the first cord blood transplant was performed by Gluckman in 1988 (Gluckman et al, 1989), the concept of banking cord blood was pioneered by Dr. Pablo Rubinstein , who was awarded grant by the National Institute of Health to set up the first National Cord Blood Banking Program at the New York Blood Centre.(National Institute of Health, USA).

Back home in India, umbilical cord research started in 1990 at Cancer Research Institute, Mumbai, but did not receive any support from the government to set up a stem cell bank (Dastur, 2005). The first private stem cell bank in India, however, was set up in 2002.

2.3 Cord Blood Banking- the Process

A cord blood bank is place that stores umbilical cord blood for future use. Cord blood banking basically involves three steps: *collection, processing and storage*. Cord blood collection is a simple, safe and painless procedure that usually takes less than 5 minutes and can be performed just after child birth in which the cord is clamped and cut and the blood is drawn from the umbilical cord in a specialized bar coded bag. These collections are further harvested for stem cells, which are then stored in cryo-vials at -196 degrees celsius in liquid nitrogen.(Dastur,2005: Warriar,2004..)

2.4 Public Vs. Private Cord Blood Banking

Cord blood banks can be primarily divided into public and private banks. While public banks accept eligible donations to be used for anyone in need; private banks allow families to preserve their blood for their own use for a fee (\$800-\$2000). The basic differences between a public and a private cord blood bank have been enumerated in Table-2.

Table-2- Types of cord blood banks

Public banks	Private banks
<ul style="list-style-type: none">• <i>Use not restricted.</i>• <i>No remuneration collected</i>• <i>Usage subject to availability</i>	<ul style="list-style-type: none">• <i>For use of the family</i>• <i>Facility paid for by the family</i>• <i>Availability guaranteed</i>

Source: Adapted from LifeCell (2005)

The medical community strongly supports public cord blood banking as it widens the compass of beneficiaries from medical advances. However, since the estimated probability of a need for cord blood stem cells within a family is 1/1500, private cord blood banking is generally not recommended. Globally, out of 100 cord blood stem cell banks, 75 are public banks.

2.5 Major Players in Cord blood Banking in India

The major players of cord blood banking in India are *Relicord* , *Lifecell*, and *Histostem*

Histostem Co. Ltd., is a South Korean, US based Biotechnology Company that is developing the latest human cell based therapy. It is a pioneer in cell based therapy. The main divisions of Histostem are cell therapy research, public cord blood bank for transplantation, and family cord blood bank. It is in the process of investing \$20million to establish the world's largest cord blood bank ,providing stem cells for transplant surgeons globally.(The Hindu, July 12, 2005)

The leading Indian player in cord blood banking and cell research is Chennai based **LifeCell**. Establish with initial investment of Rs. 140 million, LifeCell has a lab and state of art storage facility near Chennai. The world class infrastructure, which has accreditation from American Association of Blood Banks, help LifeCell provide seamless service from the collection of cord blood to harvesting, testing and finally storage. With 20 regional centers LifeCell has been able to harvest 10,000 units of stem cells.(Mathew,2008)

The third important player is **Relicord-** which is Reliance Life Sciences Stem Cell Banking services has established south Asia's first most advanced and completely automated stem cell enriched umbilical cord blood repository. This is the first cord blood repository in the world to be accorded a license by an official regulatory authority, Food and Drug Administration (FDA), Government of India.

2.5 Cord Blood Banking in India –the road ahead...

In order to boost medical tourism, cord *blood banking* is geared to make a major contribution to the country with Histostem – announcing to set up the world's largest cord blood bank in the country.(Dhar,2005) Thus, after space technology and information technology, India is now all set to usher in new revolution in regenerative medicine.

Apollo Group of Hospitals in India- a major player in the medical tourism arena- signed a Memorandum of Understanding (MoU) with Histostem Inc, to offer stem cell therapy to patients from South Asia.. Histostem and Apollo together will establish and operate treatment centers known as Histostem Cell Treatment Centers. Apollo's doctors and nurses will be trained with the help of faculty from Histostem to provide stem cell therapy protocol and help develop new treatments. Histostem has also entered into an agreement with the state governments for setting up a National (Umbilical) Cord Bank in Mumbai, Delhi, Chennai and Kolkata . (Dhar,2005)

High birth rate and lack of any stringent government regulations are the factors favoring the development of cord blood banking in India. With approximately 72000 births daily, resulting in discarding of 72000 umbilical cords a day-the storage of stem cell rich blood derived from these umbilical cords can prove to be the best possible insurance against life threatening diseases. (Dastur,2005). The Ministry of Health has approved a Grant of Rs.5 crores to upgrade its stem cell research at the Mumbai based National Institute for Research in Reproductive Health under the Indian Council of Medical Research (ICMR) (Dutta,2005).

New private cord blood banks are being established all over India in an attempt to use their knowledge, research and storage facility to benefit the Indian population. What seemed like a dream few years back is now becoming a reality. The use of umbilical stem cells for therapeutic purposes can ensure lower treatment costs and longer lives

The status of the Cord Blood banking industry in India may be best summarized using the SAP-LAP framework, which may be described as follows.

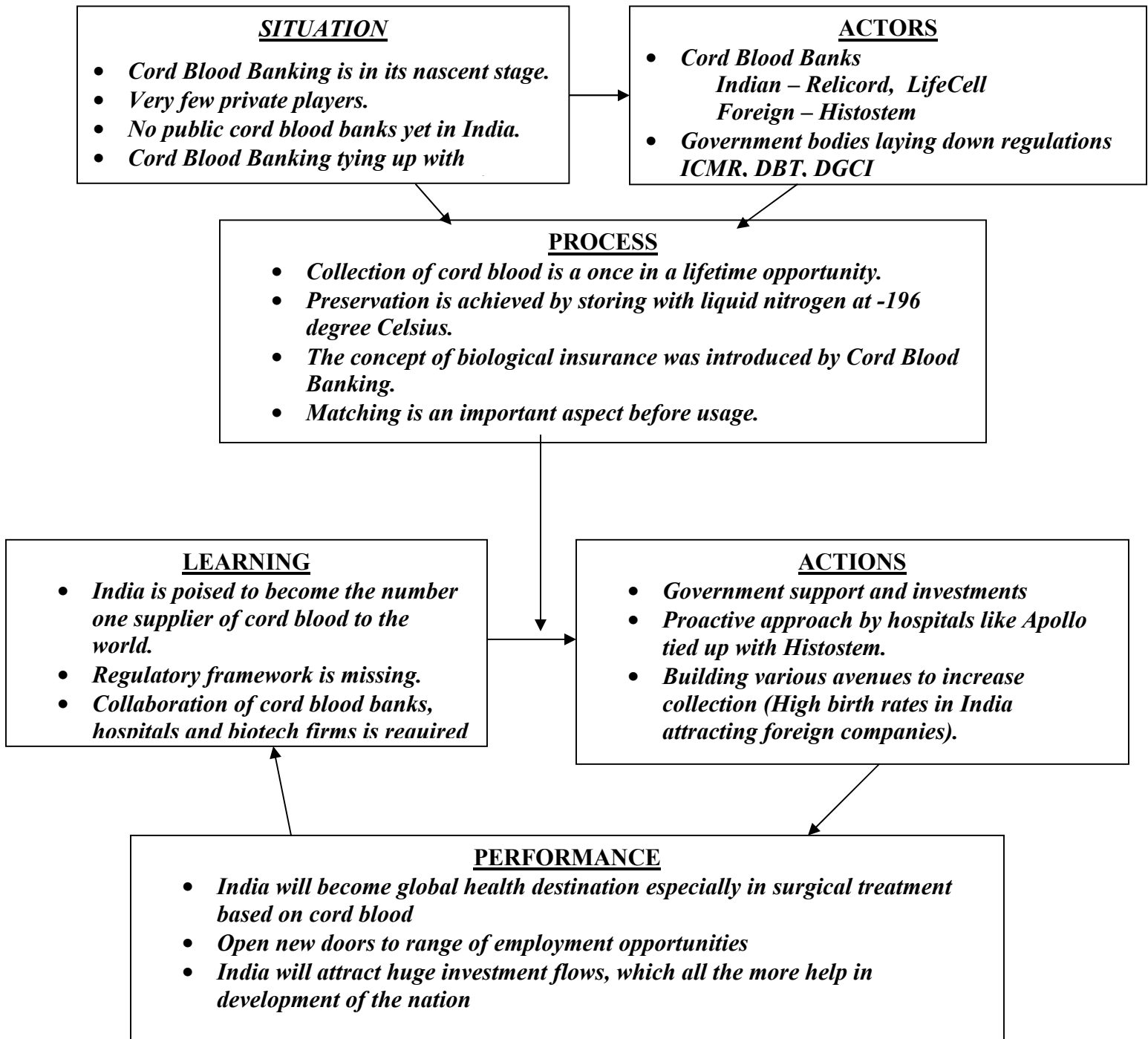
2.6 Introduction to SAPLAP Framework

SAPLAP is a holistic framework that aids the process of analysis to generate models for managerial enquiry and problem solving.(Sushil,2001) The *Situation , Actor, and Process* comprise of the SAP framework where the freedom of choice lies with the *Actor*. The situation to be dealt with ,the actor or actors who deal with the situation , and a process or processes that recreate the situation are all analyzed in the SAP framework.

A synthesis of SAP leads to LAP which deals with *Learning, Action, and Performance*. The analysis carried out in SAP framework highlight the key learning issues for the context based on which actions are suggested to address the concerns or problems. Finally, the impact of suggested actions on performance is assessed so as to justify the actions.

Given the context of this research paper, pictorial model of SAPLAP is used to depict and highlight the key aspects of both the Cord Blood Banking as well as Medical Tourism industry in India.

Figure-1: Cord Blood Banking In India- A SAPLAP Analysis



3. Medical Tourism in India- a snapshot

Medical tourism can be broadly defined as the provision of “cost effective” private medical care in collaboration with the tourism industry for patients needing surgical and other forms of specialized treatment.(recoverdiscover.com) Merging medical expertise and tourism became a policy of the government when the then Finance Minister Mr. Jaswant Singh, called for India to become a ‘global health destination’.(Financial Times,July2, 2003) .

Rising healthcare cost and longer waiting time are compelling reasons for patients from the western countries to seek treatment overseas. There are 45 million U.S citizens without health insurance and many more consider the healthcare cost exorbitant. In Canada, around a million citizens experience difficulties due to long waiting time.(Oxford analytica,2006) Boggled down by such problems, patients from the western countries, have discovered more affordable healthcare options that exist halfway around the world . Such affordable healthcare destinations not only provide cost savings to the extent of 90% but with virtually no waiting time and that too at comparable quality.(Oxford Analytica,2006). These affordable healthcare providing countries in turn have benefited from this increased inflow of foreign revenue and are thus promoting medical tourism as an industry.

Today, medical tourism has become a worldwide multibillion dollar industry, estimated to be \$40 billion by 2010(Woodman, 2007). With 220 million Baby Boom generation from U.S, Canada, Europe, Australia, and New Zealand aging by 2015, there seems to be a guaranteed market for inexpensive, high quality medical care.(Hutchinson,2005)

3.1 India as a key player

Although, India is a recent entrant into the medical tourism arena, it is poised to emerge as a major global player. As per research reports, approx. 150,000 medical tourists came to India in 2005 and the numbers are expected to increase at the rate of 28% in the coming years. In fact a study estimates that India has the potential to attract 1 billion medical tourists a year.(IndiQuest Research Report, 2007). Further, as per the study by McKinsey and the Confederation of Indian Industry, medical tourism in India is expected to become a Rs.100 billion (\$2.2b) business by 2012(CBC News,2004). The Indian government predicts that India's \$17-billion-a-year health-care industry could grow 13 per cent in each of the next six years, boosted by medical tourism, which industry watchers say is growing at 30 per cent annually (indiamedicaltourism.net).

With India’s top rated education system churning out 20,000-30,000 doctors and nurses every year and with half a dozen world class medical corporations serving medical tourists , the above predictions does not seem to be a distant reality, provided the stakeholders initiate the right move in the right direction.

3.2 Facts and Figures

India offers world-class healthcare that costs substantially less than those in developed countries, using the same technology delivered by competent specialists attaining similar success rates A liver transplant costs in the range of Rs 60 lakhs-70 lakhs in Europe and double that in the US, but the Hyderabad based Global hospital has the wherewithal to do it in around Rs 15 lakh-20 lakhs. Similarly, a heart surgery in the US costing about Rs 20 lakhs, is performed at the Chennai-headquartered Apollo Hospitals Group in roughly Rs 2 lakhs. (The Hindu Business Line,2007).

Table 3- Comparative Procedure Charges in India & US (US \$):

Procedure	Cost (US\$)	
	United States	India
<i>Bone Marrow Transplant</i>	2,50,000	69,000
<i>Liver Transplant</i>	3,00,000	69,000
<i>Heart Surgery</i>	30,000	8,000
<i>Orthopedic Surgery</i>	20,000	6,000
<i>Cataract Surgery</i>	2,000	1,250

(Source: www.medical-tourism-india.com)

Foreigners account for almost 12% of the patients treated at the leading hospitals like Apollo. Escorts, Hinduja, etc.(sify.com). These hospitals have established distinct edge in surgical treatments. For instance, Apollo claims to have achieved 99.6% transplant success rate(www.apollo.com) and the death rate among patients during open heart operations performed at Escorts Heart Institute is 0.8% , which is less than half that of major hospitals in the U.S.(Hutchinson,2005).

3.3 Competing countries

Countries that actively promote medical tourism include Cuba, Costa Rica, Hungary, India, Israel, Jordan, Lithuania, Malaysia , Singapore and Thailand. Belgium, Poland and Singapore are now entering the field. Thailand is a significant destination with six medical centers in Bangkok alone boasting of accreditation from the United States. Singapore alone attracted 250,000 medical tourists in the year 2005 (Hutchinson, 2005). South Africa specializes in medical safaris-i.e visit the country for a safari, with a stopover for plastic surgery, a nose job and a chance to see lions and elephants.

Some of the significant leaders in medical tourism globally along with their specialization area has been summarized in the Table-4.

Table 4: Major Competing Countries

Country	Specialization
Thailand	Eye surgery, Kidney dialysis, Organ transplantation etc..
India	Open heart surgery, hip & knee replacement, Bone Marrow Transplants, Cancer therapy, dentistry, cosmetic surgery.....
Costa Rica, Argentina	Plastic surgery
South Africa	Cosmetic surgery
Hungary	Cosmetic & dental procedures
Dubai	Largest international medical center "Dubai Healthcare City" to open by 2010, tie-up with Harvard Medical School...

Source: Medical Tourism growing worldwide (Hutchinson,2005).

3.4 Major players in Surgical Treatment in India

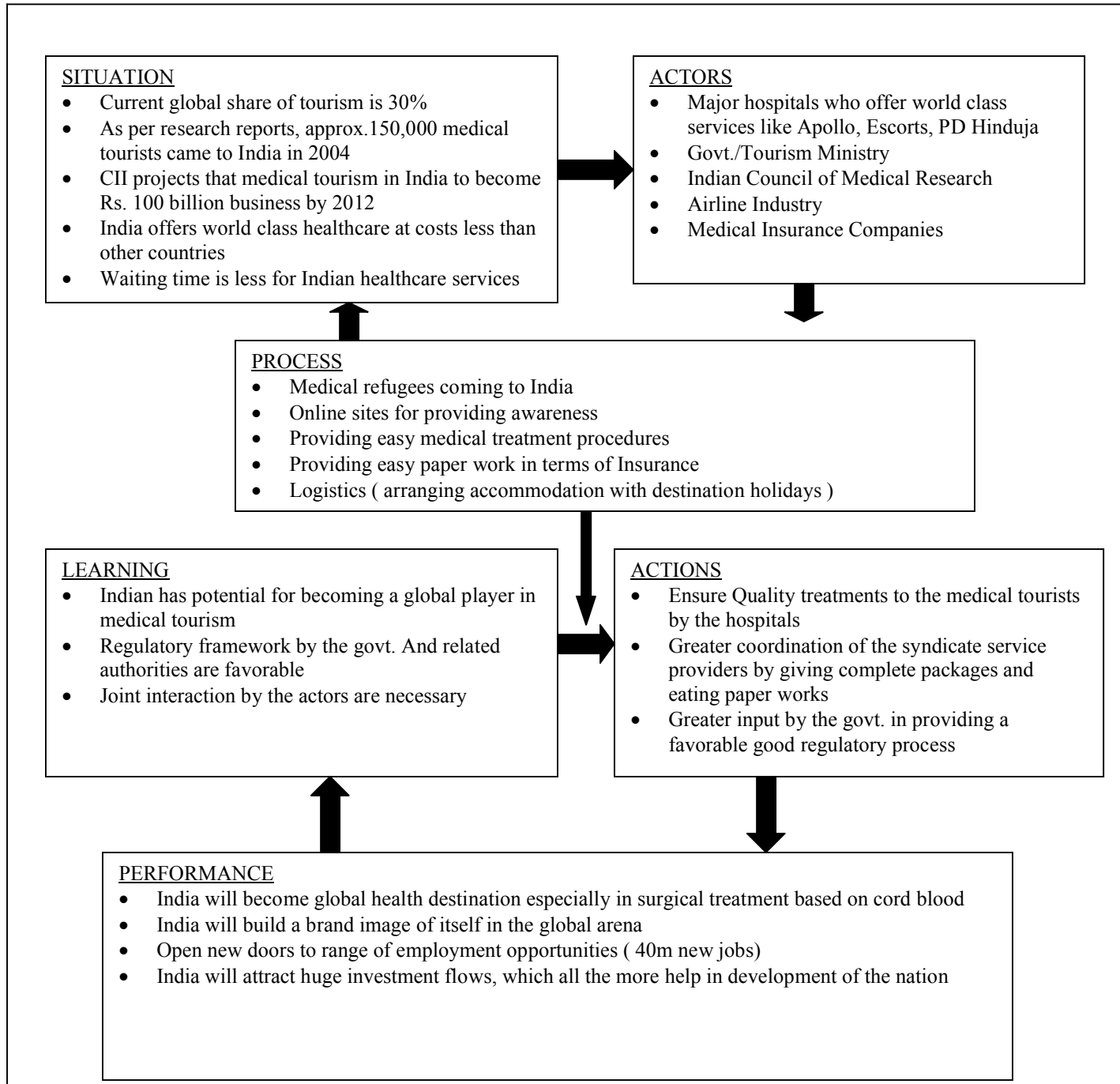
India has emerged as one of the prime countries in surgical treatment and a hot spot for medical tourism. This is possible because of the cost effective criteria with same level of expertise as provided by the west. Some of the major players that are promoting excellent surgical treatment and a key destination for medical tourism are summarized in Appendix-2

However despite the distinct edge Indian hospitals have in surgical treatments, its share in cord blood based transplants is a meager 0.25%. That is , out of the 7000-8000 cord blood transplants worldwide since 1993, only 20 such transplants have done in India so far.(LifeCell,2005).

3.5 Analysis of the Medical Tourism industry using SAPLAP framework

Based on the description of the medical tourism sector, a SAPLAP analysis is conducted depicting the current situation, the major actors /stakeholders, and the processes involved. Further synthesizing the information from SAP analysis key learning is highlighted with suggestions for the required actions and its expected outcome / performance. A pictorial model of the SAPLAP analysis is described in Figure-2, as follows.

Figure-2: Medical Tourism in India – A SAPLAP Analysis



4. Cord Blood Banking & Medical Tourism- Possible Synergies

The analysis of the cord blood banking and medical tourism industry undertaken above highlight the potential and need for a positive synergy between the two sectors.

On one hand, India with high birth rate (72,000 births per day) is fast becoming a logical choice for cord blood banking –which is further facilitated by breakthrough in stem cell research. On the other hand, India has emerged as the preferred destination for surgical treatments -for which cord blood is for some and has the potential to become a critical input for many such treatments.

Against this backdrop, it may be hypothesized that planned development in cord blood banking would provide the required fillip to medical tourism enabling India to achieve its objective of becoming a “global health destination”-as envisaged in its policy. To understand the pros and cons of the possible synergies between the two sectors, scenario building technique is used.

4.1 Introduction to the Scenario Building Technique

‘Scenario Building ‘is an important management technique used in strategy planning and policy formulation (Saxena et al, 2006). Although the concept of scenario was first introduced by Berger in 1964,(Berger,1964) the word ‘scenario’ was reportedly first used by Herman Kahn in 1967.(Kahn,1967). Scenario based forecasting, however was quite popular with military planners. Use of scenario planning to guide business strategy was started by Wack in 1971 at the Royal Dutch Shell group of companies. (Wack, 1971)

A scenario is basically the description of a future situation based on sequence of events leading from the present situation to the future situation (Saxena et al, 2006). Scenarios are not projections, predictions or preferences, but alternative futures. It is a story that describes a possible future, identifying some significant events, the main actors ,helping people explore what the future might look like and the likely challenges of living in it. (Watt and Davis,2003).There are various methods of scenario building ranging from quantitative simulations to highly creative methods. To name a few are System Dynamics simulations (Forrester,1961), Harva method, Story telling etc..(Maira et al,1997).

4.2 Scenario Building- the Methodology

To explore the possible synergies between cord blood banking and medical tourism in India a mix of Harva method and the Shell’s method for scenario building is used. The steps undertaken to arrive at the potential scenarios may be broadly enumerated as follows.

- *Decision on the key question to be answered by the analysis*-given the context of the paper, the key question is “What are the possible synergies between cord blood banking and medical tourism sector in India?. This key question however was finalized after extensive data search and brainstorming sessions with cues obtained from the stakeholders of the industry.
- *Setting the time and scope of analysis*- A usual timeframe of 10-12 years has been considered.
- *Identification of major stakeholders*- Although there may be a number of stakeholders , but the major ones considered are Cord Blood Banks, Healthcare Majors, Government Bodies and Stem Cell research organizations.
- *Mapping basic trends and driving forces*-Forces driving changes in these sectors are identified and trends are mapped to for an in depth understanding of the context. A number of creative techniques like Mess finding, brainstorming, etc have been used in this step. SAPLAP analysis of the sectors discussed above has further enhanced the clarity of the context.
- *Finding key uncertainties*- Key uncertainties refer to those driving forces which are important and uncertain(less predictable). In our context , the two basic uncertainty identified areas follows

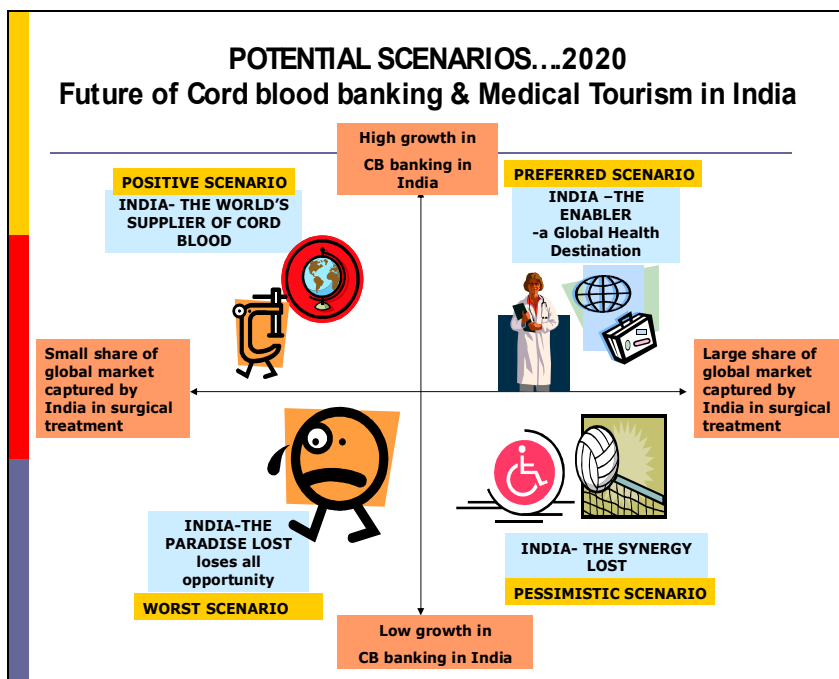
- *Size of the global surgical treatment market captured by India-* Although the current trends are positive, but competitive pressures, lack of governmental support, etc may limit the expected growth.
- *Rate of growth in cord blood banking-currently high growth rate is expected, but that is subject to various factors like successful stem cell research, government policy, etc..*
- *Identify the potential scenarios by mapping the two uncertainties-* Mapping the uncertainties identified above on xy axis helps identify the future potential scenario. For our context, four potential scenarios identified (Preferred, Positive, Pessimistic, and Worst scenario) are further explained in detail and represented in the Fig-3.
- *Describe the scenarios-* To develop greater insight into each of the potential scenario and to present a vivid picture of these possible future situations, the scenarios are described in detail highlighting the reasons for it.
- *Recommend actions for the stakeholders to achieve the preferred scenario-* Having identified the preferred scenario for the future, the next logical step is to identify what needs to be done. For this actions are recommended for the stakeholders, to help preferred scenario come true in the future.

4.3 Potential Scenarios for Cord Blood banking and Medical Tourism in India

The extent of cord blood banking triggering boom in medical tourism seems to depend on two basic uncertainties.

- *Size of global surgical treatment market captured by India*
- *Rate of growth in Cord Blood Banking in India*

The potential scenarios based on the above two key parameters may be depicted in the Figure-3 as follows
Figure-3: Potential Scenarios---2020



4.4 Description of the potential Scenarios...2020

As evident from the Figure-3, four scenarios have been identified which may further be described as follows:

- **Preferred Scenario-2020: India –The Enabler- -a Global Health Destination**

Realizing the potential in cord blood based treatment , India seized the opportunity with both hands. On one hand the health care majors strengthened their expertise in surgical treatments and could market it globally. On the other hand players in the cord blood banking arena, geared to capitalize on the emerging stem cell research, decided to increase their repositories of cord blood. Backed by high birth rate and favorable regulatory climate cord blood banks triggered the boom in medical tourism – making India a global health destination.

- **Positive Scenario-2020 : India- The World’s Supplier Of Cord Blood**

Despite the competitive edge in surgical treatments, India could not market itself well in the global market due to lack of coordination among the syndicate service providers. Further due to increased competition from other countries and lack of adequate support from the government India could not attract greater number of medical tourists. The players in cord blood banking , however, realizing the potential of cord blood based treatment could build huge repositories as targeted further foreign players like Histostem , along with Indian players like Relicord and Lifecell , could leverage the opportunity making India the worlds’ supplier of cord blood.

- **Pessimistic Scenario-2020 : India- The Synergy Lost**

The competitive edge in surgical treatments of major health care players were adequately harnessed and marketed well by India Inc. , thus increasing its global share of cord blood based treatment from 0.33% to 10% . However due to lack of adequate supply of cord blood – a critical input for such surgical treatments – India loses out a major share to the competitors. Had cord blood banking sector been established simultaneously India could have captured additional 10% of the global share.

- **Worst Scenario-2020 : India-The Paradise Lost - Opportunities Lost**

Despite identifying the up coming opportunity in cord blood banking in surgical treatments, the stake holders of the sector could not leverage it further. Governmental bodies like ICMR, DBT, DCGI, could neither invest (UK govt. invested £200 mn) nor lay down proper policy for growth of cord blood banking in India. As a result India could manage just a marginal growth in cord blood banking. Further health care majors could not market itself despite distinct competitive advantage and failed to attract medical refugees. Today India stands on the sideline watching it competitors reap the benefits of the boom in cord blood based surgical treatment.

4.5 Actions Recommended for the Preferred Scenario

Given the scenarios discussed above, actions maybe recommended for the following stakeholders to help emerge India as the “Global Health Destination”-the preferred scenario.

- *Cord Blood Banks*-like LifeCell, Reliance Life Sciences, Cryobank, Histostem, etc have already geared up to capitalize on the upcoming potential. The need of the hour is to increase the number of repository of cord blood samples. To achieve this the actions recommended may include the following:
 - Building awareness –establishing collection centers
 - Providing training for the specialized & contamination free collection process
 - Tie –up with hospitals engaged in cord blood based treatment
 - Diversify into public cord blood banking
- *Healthcare Majors*- like Apollo, Escorts, Hindujas, Fortis, etc need to be proactive in not only facilitating the collection of the cord blood but also help in clinical trials and establish state of art to conduct cord blood based surgical treatments. Some of the actions recommended for them to realize the preferred scenario may be enumerated as follows:
 - Strengthen their expertise in surgical treatments
 - Market their expertise globally to increase the number of medical refugees visiting India

- Tie-up with syndicate service providers (travel & tourism sector) offering attractive packages to the medical tourists
- Tie-up with cord blood banks to have convenient access to the critical input for treatment
- *Government Bodies*-Indian Council of Medical Research (ICMR), Department of Biotechnology, and Drug Controller General of India (DCGI) are the major regulatory bodies responsible for formulating policies in this area. Some of the major strategic actions required to be undertaken by them are as follows:
 - Issue guidelines on Umbilical cord blood banking facilities
 - Facilitate Stem Cell Research through public-private partnership
 - Encourage public cord blood banking to extend affordable treatment for all
 - Favorable regulations for travel & tourism sector

Draft guidelines for stem cell research –including guidelines for cord blood stem cell banking have already been formulated and submitted by ICMR and DBT in July 2006. On July 16, 2007 a joint committee of ICMR and DBT has been organized to discuss the Annexure on “Laboratory standards for cell collection and processing for clinical use” (Biospectrum, 2007)

- *Stem Cell research organizations*-are poised to play a significant role, given the fast pace of stem cell research. Increased outlay for research, public –private partnership and tie-up with the hospitals for clinical trials would further pave the way for faster growth in this arena.

5. Conclusion

Medical tourism growing at the rate of 30% annually has distinct competitive edge in surgical treatments. Despite medical expertise India’s global share in cord blood based surgical treatment is a meager 0.25%. (20 out of 8000 cord blood transplants). Major break through in stem cell research promising low cost treatment is attracting foreign players in India. While advancement in stem cell therapy would provide solutions to incurable and severe injuries, an established cord blood banking sector in the country would widen the compass of beneficiaries by making these affordable for the masses.

Further, with the number of medical tourists expected to reach one billion a year, and with world’s largest cord blood bank being set up at Mumbai, favorable government policy and regulation for the health care, travel, and tourism sector may enable India to become a ‘Global Health Destination’.

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Appendix-1

Glossary:-

stem cells

Stem cells are the master cells responsible for producing all the mature cells in our blood and immune system. It contains white blood corpuscles that fight infection, red blood corpuscles that carry oxygen, and platelets that promote clotting and the cells of our immune system. Stem cells that are found in abundance in bone marrow have the ability to regenerate into other types of cells in the body. There are three sources from which stem cells can be derived- embryonic, adult and umbilical cord.

Cord Blood

Blood taken out of the umbilical cord of a newborn, with the consent of the mother, finds its way into a cryogenic depository powered by liquid nitrogen. A decade or so later, the stem cell-enriched cord blood is taken out of this bio-archive to treat the same child, now a young adult suffering from an otherwise incurable disease — say a genetic disorder or a blood cancer variant.

Source: www.Wikipedia.org

Appendix-2 Major players in Surgical Treatment in India

APOLLO HOSPITALS GROUP

Located at Delhi, Chennai, Hyderabad & Madurai

The Apollo Hospitals Group is today recognized as the "Architect of healthcare" in India. The Apollo group alone has so far treated 95,000 international patients, and has been a forerunner in medical tourism attracting patients from Southeast Asia, Africa, and the Middle East. The group has tied up with hospitals in Mauritius, Tanzania, Bangladesh and Yemen besides running a hospital in Sri Lanka, and managing a hospital in Dubai.

ESCORTS HEART INSTITUTE & RESEARCH CENTRE

Located at Delhi, Faridabad, and Amritsar

Escorts is steadily consolidating its presence in healthcare. Currently, Escorts is operating three large hospitals in New Delhi, Faridabad and Amritsar. Escorts Heart Institute and Research Centre (EHIRC), New Delhi, has been ranked as the best cardiac hospital in India by an Outlook-Cfore survey and has been given the highest grade by CRISIL - an acknowledgement of the quality of delivered patient care. EHIRC is a leader in the fields of cardiac surgery, interventional cardiology and cardiac diagnostics. The 332-bed Institute has nine operating rooms and carries out nearly 15,000 procedures every year. Escorts, claims it has doubled its number of overseas patients - from claims it has doubled its number of overseas patients - from 675 in 2000 to nearly 1,200 this year.

PD HINDUJA NATIONAL HOSPITAL & MEDICAL RESEARCH CENTRE

Located at Mumbai

An ultramodern hospital, PD Hinduja National Hospital & Medical Research Centre was established by the Hinduja Foundation in collaboration with Massachusetts General Hospital (MGH), Boston. The 351-bed hospital offers comprehensive services covering the gamut from diagnosis and investigation to therapy, surgery and post-operative care.

Source: www.apollohospitals.com ; ; www.ehirc.com; www.hindujahospital.com