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EMERGING ISSUES IN THE AREA OF MANAGEMENT OF INTELLECTUAL PROPOERTY RIGHTS IN FLEXIBLEAN MEDICINE SECTOR OF INDIAN PHARMACEUTICAL INDUSTRY

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Abstract

As signatory to WTO, India accepted new aspects related with protection of intellectual property in the various forms as per intenatioanl conventions. One of the industry in India which has tremendous impact on its operations by accepting this new regime is pharmaceutical industry. Again to be very specific traditional herbal drugs segment, to match global competitiveness in this segment. Present paper discusses various domestic and global aspects which are going to shape global aspirations of traditional herbal medicine segment of Indian Pharmaceutical industry.

1. INTRODUCTION

The healing relationship between humans and natural products stretches back almost as far as the dawn of humankind. Natural products are still (indeed more than ever) are excellent source of novel bioactive compounds for therapeutic applications, since the extreme fine-tuning of natural molecules towards their macromolecular targets has already been achieved by evolution. Natural products comprising of over 2,50,000 plants species, over 3 million species of micro-organisms, more than 10 million species of marine macro-fauna and 30 million species of insects and mycobacterium. This abundant wealth of natural products offering broad structural diversity and biological potency. Natural molecules have been successfully used to treat many human diseases and ailments for centuries and are still a mainstay in modern medicine. Natural products and natural products derived substances comprised about 35 % of total pharmaceutical market¹. Further, world's 60 % population relies almost entirely on plants for medication. This major combination of natural products in therapeutics is derived from biological screening of less than 10 % to world's bio diversity. A recent study determined that about 40 % of chemicals by

¹ Patwardhan B; Vaidya A.D.; Chorgade M, Ayurveda And Natural Products Drug Discovery. Current Science, Vol 86, No 6, 2004 (789)

synthetic compounds are based on molecules derived from natural materials. Thus, even in era of combination chemistry natural products will be a dominant source for new drug discovery. Across the length and width of country, wide climatic conditions put India in top ten biodiversity rich countries. This bio diversity, especially, plant bio-diversity is the birth-cause of development of traditional systems of medicine like Ayurveda, Siddha, Unani in India. These traditional system of medicines along with folk/tribal / community medicine have been practiced since several centuries, which are very valuable source of knowledge². Thus, this valuable, time-tested traditional knowledge and rich biodiversity are the valuable assets of India. Unfortunately, because of general reasons, both these assets need immediate protection to achieve a goal from enduring benefits to the nation. In recent years, the global demand of herbs for various purposes including for medical treatment is increasing continuously. It has grown 6.3% p.a. since 1997. Herbals are used worldwide for various industrial and consumable purposes. They are classified as,

- Food
- Nutraceuticals
- Commercial seeds
- Industrial Enzymes
- Fragrance and Flavors
- Herbals and Botanicals

Out of above class we are only referring here herbals and botanicals. Global market for herbal supplements currently exceeds Rs 6600 crore. European market is Rs 3080 crore, Japan 1056, Rest of Asia Rs 1188 crore and North America Rs 1320 crore (in year 1998). Global phytomedicinal market for nutraceuticals is estimated at Rs 110000 crore and for the herbal drugs Rs 5456 crore.

Advantages of Plant Base Drugs.

1. Long history of use and better patient tolerance as well as public acceptance
2. Renewable source.
3. Cultivation and processing is environmental friendly.
4. Local availability, especially in developing countries.
5. Several important recent break-through, e.g., gugulipid, artemesinin, taxol, etc.

2. MODERN APPROACHES TOWARDS HERBAL MEDICINE.

Following are the some aspects of herbal medicines, which should confirm with international specifications and modern scientific methods for global supply of standardized herbal medicines,

- Botanical identification of herbal drugs.
- Processing of medicinal herbs.
- Isolation and characterization of active principles.

² Robert J. L.; Lettington; Kent Nnadzie, A Review Of Intergovernmental Committee On Genetic Resources, Traditional Knowledge And Folklore At WIPO, Occasional Paper. Trade Related Agenda, Development And Equity (T.R.A.D.E.), South Center, December 2003

- Standardization.
- Documentation.

As far as India is concern, we primarily talk about Ayurveda as main area in indigenous system of medicine. But as for new WIPO approach, traditional medicinal is classified into two sub types

- 1) Traditional Medicine (TM) like Ayurveda, Sidha, Unani, Tibetan traditional.
- 2) Non-codified medicinal knowledge like folk, tribal & indigenous medicine.

To apply modern aspect of standardization to these systems, Several Pharmacopoeias have provided monographs stating quality parameters of many herbs and herbal products^{3,4,5,6}. Names of few of these Pharmacopoeias are,

- British Herbal Pharmacopoeia.
- Japanese Pharmacopoeia.
- United States Pharmacopoeia.
- British Herbal Compendium.
- German Commission E.
- Ayurvedic Pharmacopoeia of India.
- Monographs on Herbs by European Scientific Co-operation for Phytotherapy (ESCOP).
- Chinese Herbal Pharmacopoeia. (CHP)
- World Health Organization Monographs. (WHO)

⁴ Kokate C.K.; Purohit A.P.; Gokhale S.B., Pharmacognosy, 16th Edition 2001, Nirali Prakashan, Pune.

⁵ Narayana D.B; Dobriyal R.M., Emerging Standards For Traditional Medicine, Express Pharma Pulse, December 2002.

⁶Pharma Times, Vol 37, No 6, Indian Pharmaceutical Association, June 2005

Most of these pharmacopoeias recommend marker compound testing of herbals in their monographs. But Indian Pharmacopoeia or Ayurvedic Pharmacopoeia of India does not recommend chromatography methods for standardization of herbs. This creates problems in exports of herbs from India. Recent ban on Ayurvedic products exports to European Union and United Kingdom by publishing two directives - Traditional Herbal Product Directives and Food Supplement Directives are direct outcome of lacks of quality control approach by Indian agencies^{7,8,9}. By these measure India will lose its current exports of Ayurvedic and herbal products, which is worth of Rs.350 crore. It will also hamper future exports to market expected to grow to Rs. 3500 crore by the year 2010.

3. GLOBAL HERBAL DEMAND.

In recent years, global demand of herbs in the form of medicine, cosmetics & nutraceuticals have increased manifold. As per WHO report, world's 60 % population relies almost entirely on plants for medication. On the other hand, developed world shows an inclination towards use of herbs in medicines, cosmetics and food supplements. Global market for nutraceuticals and herbal drugs touches to US \$ 250 and 12.4 billion respectively accounting around 35 % share in pharmaceutical market with an annual growth rate 6.3 % since 1997

India is one of the top ten biodiversity-rich country with wealth of traditional knowledge offer a vast opportunity to the country to become an important player in world herbal market. Because of such demand for herbal medicines, market is getting more and more aggressive and stringent for enforcing produce standards. Thus, it has now become very essential that the plant material grown, harvested and processed for manufacturing as per the standard protocol to ensure product uniformity, efficiency and safety.

⁷Indian Journal Of Traditional Knowledge, National Institute of Scientific Communication And Information Research, Council For Scientific And Industrial Research (CSIR), New Delhi. www.niscair.res.in.

⁸Business Times, The Times Of India, Pune, 26-02-2003.

⁹Warde Dyaneshwar; Patwardhan Bhushan, Journal Of Scientific And Industrial Research, February 2005(83).

According to the EXIM Bank Report (1997), India is ranked as major exporter of not only medicinal plants and vegetables / sap extracts but nowadays in export of bioactive secondary metabolites

4. INDIAN HERBAL MARKET

India can be a major player in the global market for herbal product based medicines¹⁰. Exports of herbal materials and medicines can jump from just Rs.456 crore now to Rs.3, 000 crore by year 2005 and with a "grand strategic plan", exports can shoot to Rs.10, 000 crore by year 2010

A 13 member task force on the conservation and sustainable use of medicinal plants predicted that there is a growing demand for plant-based medicines, health products, pharmaceuticals, food supplements and cosmetics. The international market for such plants is more than 60 billion a year and growing at a rate of seven percent within the country. This could well result in affordable health care and conserve biodiversity

According to the members of task force, India already has the expertise, medicinal plants are used in homes, there are 1.5 million practitioners of traditional medicine system, about 4.6 lakh registered practitioner and more than 8,000 registered pharmacies of Indian system of medicine and homeopathy. Varieties of the plants are collected from the wild, generating about 40 million man-days of employment.

¹⁰ Handa S.S.; Medicinal Plants Based Industry And Emerging Plant Drugs, Review Article, Central Institute Of Medicinal And Aromatic Plant Research (CIMAP), Lucknow.

INDIGENOUS DEMAND

By exporting Isapgul (Psyllium) husk (to 35 countries) and seed (to 17 countries) during April-Oct. 1997, the country earned Rs. 88.0 crores and Rs.6.5 crores, respectively in foreign exchange. The amount was Rs. 8.43 crores for Senna leaves and pods. During the same period for all other items the amount (except for saps and extraction of Opium for which the amount was 22.96 crores) was less than 1.2 crores^{11, 12, 13}. Under the title "Other (than) Ginseng roots" the amount was 13.62 crores. Export values for all plants and plant products, except Isabgol, Opium poppy and Senna are low, fluctuating, scanty, sometime contradictory and because of strong resentment by exporters, number of plants and their products which are banned for export is often subsequently downwardly revised. Moreover, illegal export of baned items cannot be effectively checked. Thus except Isabgol, as far as medicinal plants are concerned export figures cannot be our sole or a major criteria in prioritizing and choosing plants for germplasm collection and conservation and developing their agro-technologies.

6. EXPORT POTENTIAL OF AYURVEDIC MEDICINE.

Today, India is synonymous with software services in the global economy. Tomorrow, Ayurveda might just knock it off its perch. Its Vedic connection makes Ayurveda a highly saleable concept, and medical exporters could simply reap the benefits of the west's disillusionment with Allopathic.

Two systems of herbal medicine, Ayurveda and Unani, have been identified as the fastest growing with exports pegged at Rs.220 crore in 2000-2001. Reports of the Mumbai-based Chemexcil (Basic Chemicals, Pharmaceuticals & Cosmetics Export Promotion Council) indicate a quantum leap in exports in the three years (2000-2003). Exports to Russia touched Rs.27 crore in 2001, up by 62 percent from the previous year; value of exports to the US and Germany was Rs.22 crore each; Australia Rs. 9 core; and Switzerland Rs.6.5 crore, in 2001. Even Asia countries like Hong Kong and China have a sizeable market. Total global market for traditional medicine is estimated at \$ 60 billion. Of this China grabs 20% share and Indian share is 2%. By the year 2010 India's share may reach to Rs. 3500 crore and world market for traditional medicine may reach up to \$ 5 trillion by the year 2050.

¹¹ Dalal K.C.:Joshi P.P.:Mandal K., Strategy For Conservation And Availability Of Medicinal And Aromatic Plants, National Research Center For Medicinal And Aromatic Plants (Indian Council For Agricultural Research) Boriavi, Gujrat.

¹²Herbs-Challenges In New Millennium, MACS-Agarkar Research Institute, Pune ,February,2001.

¹³ Shintre Shubhada, Need For Backward And Forward Linkages For Cultivation Of Medicinal Plants, Mahratta Chambers Of Commerce, Industries And Agriculture ,Pune.

To mitigate problem related with quality control of herbal medicines, the Indian Government has taken steps to create a Traditional Knowledge Digital Library (TKDL) on traditional medicinal plants and systems, which will also lead to a Traditional Knowledge Resource Classification (TKRC). Linking this to internationally accepted International Patent Classification (IPC) System will mean building the bridge between the knowledge contained in an old Sanskrit Shloka and the computer screen of a patent examiner in western countries. This will eliminate the problem of the grant of wrong patents since the examiner will know the Indian rights to that knowledge.

Eventually the creation of TKDL in the developing world would serve a bigger purpose in providing and enhancing its innovation capacity. It could integrate widely scattered and distributed references on the traditional knowledge systems of the developing world in a retrievable form. It could acts as a bridge between the traditional and modern knowledge systems. Availability of this knowledge in a retrievable form in many languages will give a major impetus to modern research in the developing world, as it itself can then get involved in innovative research on adding further value to this traditional knowledge, an example being the development of an allopathic medicine based on a traditional plant based therapeutic. Sustained efforts on the modernization of the traditional knowledge systems of the developing world will create higher awareness at national and international level and will establish a scientific approach that will ensure higher acceptability of these systems by practitioners of modern systems and public at large.

Constraints In Standardization In Herbal Formulations By Marker Compounds Testing.

- Non - availability of library of marker compounds isolated from herbs in their pure forms to be use for analytical purposes.
- Lack of proper communication and the will of quality assurance to undertake such activity.
- Non-availability of system where standard or properly identified herbs are available for the industry.
- High cost involved in the procurement of sophisticated imported instruments like HPTLC and HPLC etc.

At par with Chinese Traditional Medicine, India needs to standardize its traditional medicine as a holistic approach towards health by establishing its own standards. Because there is inherent difference in concepts of standardization of raw materials and finished products on the line of Allopathic System of Medicine and treatment as per Indigenous system of medicines practiced all over the world.

If we consider Indian systems of medicine as a separate approach towards health, standardization of this medicine has to be looked from separate angle. This is long process and government of India, Industry and academicians must look in this matter of standardization and total system approach to make it more accessible and economically major area of activity.

FUNCTIONS SUGGESTED AND AGENCIES IDENTIFIED IN CONSERVATION AND AVAILABILITY OF MEDICINAL PLANTS.

Component	Function	Identified Agency For Function
In situ	Conservation and studies on (and compilation of information on) eco-distribution mapping of endemic medicinal plants.	Forest Department. (If and where appropriate) Botanical Survey work will be carried out in consultation with and/or in collaboration with : Botany/ Bio science Departments of Non-Agricultural Universities Dravyaguna Departments of Ayurved College/University. And Centres of the Botanical Survey of India.
Ex situ	1 Conservation and Research on Agro- technology	National Agricultural Research System
	2 Revitalizing the dying and discussed local health traditions (by providing local people with medicinal plants to meet primary healthcare needs and impart training and information to them, particularly women, in their use).	Religious organization which are cultivating medicinal plants and are preparing their own herbal medicines and providing it to local communities. Primary Health Centers (PHCs) Community titled agencies (NGOs) Ayurved University and Ayurved Colleges of the country. Dept of Horticulture of the State Governments. Enlightened farmers and citizens.

7. MEDICINAL PLANT BASED DRUG INDUSTRY.

Medicinal Plant Based Drug Industry has four sectors;

1. Plant Drugs for ISM covering Ayurveda, Unani and Sidha Systems.
2. Non prescription items involving plant parts, extracts and galenicals.
3. Essential oils.
4. Phytopharmaceuticals.

At present no sufficient authentic data of herbal drug raw material quantities is available. This is because most of the raw material used is collected from forest and out of total trade, majority of trade is undocumented. This is because Govt. restrictions on trading of material of ecological importance. In last decade, there are consistant efforts were taken place to cultivate medicinal herbs of commercial

importance by Govt., herbal companies and farmers. But still trade in herbal raw material supply in India is unorganized

Emerging Plant Drugs

- Antiprotozoal drugs from plants.
- Amoebicidal drugs.
- Antil-ulcer Drugs from plants.
- Plant Drugs for Cardiovascular diseases.
- Anticancer drugs from plants.
- Hepatoprotective plants.
- Antiinflammatory Plant Drugs.
- Plants for Branchial asthma.
- Plants as Antidiabetics.
- Plants for Urinary stones.
- Plants as Sedatives and Tranquilizers.
- Plant Laxatives
- Plants adoptogenes.
- Plants having Antiviral actions.
- Plant Sweetners.

7. IPR AND TRADITIONAL MEDICINE.

Issues related with protection of traditional medicine knowledge

As the knowledge of traditional medicine and medicinal plants grows in economic and trade value, the need to protect it and secure fair and equitable sharing of any benefits derived from it is of increasing concern¹⁴.

Traditional knowledge has been intensively discussed in the WTO TRIPS Council in the context of the review of Article of the TRIPS Agreement, which started in 1999. Among the issues under discussion in the TRIPS Council relevant to the subject of traditional medicinal knowledge are the following:

- a. Protection of traditional knowledge either through existing forms of intellectual property rights or other laws or through a *sui generis* form of protection.

¹⁴ Francis Mangeni, Technical Issues On Protecting Plant Varieties By Effective *Sui-Generis* System, Occasional Paper, Trade Related Agenda, Development And Equity (T.R.A.D.E.), South Center, December 2000, Geneva.

- b. Prevention of the improper patenting of traditional knowledge and plant genetic resources, including how to improve the databases of such knowledge for this purpose.
- c. The relationship between the TRIPS Agreement and the Convention on Biological Diversity in general and the operational implementation of the provisions of prior informed consent and fair and equitable benefit sharing as set out in Article 8(j) of the Convention of Biological Diversity in particular.
- d. The relation of work in the TRIPS Council with intergovernmental discussions this issue such as in the CBD, WIPO, FAO and UNCTAD.

Many of these issues were discussed in a WHO workshop on intellectual property rights in the context of traditional medicine. Other work in this area is being pursued by WIPO to explore how existing intellectual property rights can be used to provide protection to traditional medicine practitioners. Others stress the difficulties that herbal medicines and traditional medicinal practitioners will face if they rely only on Western models of intellectual property rights protection. Thus, there is a need to develop alternative approaches to promote and protect traditional medicine and assure an equitable sharing of its benefits. In addition, it will be important to explore how countries can utilize the flexibility provided under the TRIPS Agreement to promote easy access to traditional medicines for health care needs of developing countries.

To safeguard the interest of local population and effective use of natural resources, following points are important which are related with intellectual property rights

- Conversion of collective knowledge of society in to the proprietary knowledge for profit.
- Safeguards for protection of knowledge with benefit sharing.
- Diversity & creativity of Indigenous approach to IPR issues.
- Collective ownership of knowledge.
- Non-market based rights.
- Benefit sharing model for indigenous innovations.

IPR ISSUES RELATED WITH TRADITIONAL MEDICINE

Not in public domain	<ul style="list-style-type: none"> • Patents • Plant breeders rights • Provisions under undisclosed information • Trade secretes
Community economy benefits	<ul style="list-style-type: none"> • Geographical indications and trade marks • Sui generis analogies.

TABLE 11.13
CONVENTION ON BIOLOGICAL DIVERSITY (CBD) Vs. TRIPS

Main CBD issues	<ul style="list-style-type: none"> • Conservation of biodiversity • Sustainable use of its components • Fair and equitable sharing of benefits on derived products • Protection of traditional access to genetic resources and technology.
Main TRIPS issues	<ul style="list-style-type: none"> • Reduce distortion and impediments to international trade • Promote effective and adequate protection of intellectual property rights (IPR), including for plant varieties and other genetic innovations • Ensure that measures and procedures to enforce IPR do not themselves become barriers to legitimate trade
Potential Conflicts	<ul style="list-style-type: none"> • TRIPS asserts IPR protection on life forms; CBD asserts national sovereignty and right to prohibit such protection • CBD promotes equitably shared benefits from use of biological resources and protection of traditional knowledge; TRIPS promotes private appropriation of benefits with no mechanism for acknowledging role of traditional knowledge from which industrial applications may derive
Potential Resolutions	<ul style="list-style-type: none"> • Article 1 of TRIPS provides some flexibility, allowing domestic law to exceed minimum protection standards – a provision that could allow member nations to enact legislation to protect traditional knowledge. • Article 27.2 of TRIPS allows for the exclusion from patentability based on public order or morality • Article 27.3b of TRIPS allows for the development of unique IPR protection systems for plants, animals, and essentially biological processes, creating an opportunity to develop

8. TRADITIONAL MEDICINE AND WHO.

In recognition of the importance and benefits of traditional medicine to world health, the World Health Organization established the Traditional Medicine Program in year 1976. The program, which is housed in Geneva, Switzerland, is the only one of its kind and serves to promote and develop safe and effective use of traditional medicine throughout the world through scientific research, clinical investigations,

education and training, as well as information exchange. The policy of the Traditional Medicine Program (TRM) is based on a number of resolutions adopted by the World Health Assembly and the Regional Committees. These policies highlight the fact that:

- (1) Much of the world's population depends on traditional medicine and medicinal plants for primary healthcare.
- (2) Traditional medicine practitioners are a potential important resource for the delivery of healthcare.
- (3) Medicinal plants are of great importance to the health of individuals and communities.

Moreover, the Declaration of Alma Ata, drafted during the International Conference of Primary Health Care convened by WHO and UNICEF at Alma-Ata, USSR in 1978, provided for the incorporation of proven traditional medicines into national drug policies and regulatory measures. As a consequence, WHO urged its Member States to initiate comprehensive programs for the identification, evaluation, preparation, cultivation and conservation of medicinal plants are used in traditional medicine; and to ensure quality control of drugs derived from medicinal plants by the implementation of modern techniques, and by applying suitable standards and good manufacturing practices (GMP). To facilitate the enactment of these policies WHO-TRM established a number of WHO Collaborating Centers for Traditional Medicine throughout the world. The WHO Collaborating Centers are the technical backbone of the program. They form a world-wide network in the different areas of WHO's network, which provide the Secretariat and Member States with basic technical and scientific input, resulting from the research and expertise at the Collaborating Centers, which is put at the disposal of the global healthcare system. Currently, there are 25 collaborating centers worldwide, and they assist WHO-TRM in five main areas;

- (1) National program development.
- (2) Health systems and operational research.
- (3) Clinical and scientific investigations.
- (4) Education and training.
- (5) The exchange of scientific information.

9. FUTURE DIRECTIONS

As past experiences have demonstrated, international collaboration in the field of traditional medicinal plant research is a multifaceted and mutually beneficial endeavor. However, much work remains to be done. While it has been estimated that between 35,000 to 70,000 plants or plants or plant products have been used globally as medicines, only a small fraction of these plants have ever been thoroughly investigated on a scientific level. Thus, the large numbers of plant species that have not been investigated represent a potential rich resource for the world to explore. The future of traditional medicine and medicinal plant research will rely heavily on international collaborative efforts. However, strong national support for these programs is also needed. Research and development of traditional medicines, supported at the national level, will be essential for capacity building in developing countries. Strong national support for these activities is strategic to the overall

development of new drugs from local medicinal plants, and for the promotion of safe and effective traditional Medicines. The initiation of medicinal plant research programs will require a serious commitment in terms of effort and money; however, failure to do so will ultimately be more costly.

Establishing quality, safety and efficacy for plant-based medicines will be another goal for future research. By the application of advanced scientific techniques to the cultivation, selection, manufacture and clinical trials of herbal medicines, developing countries can transform traditional medicines into a modern medical industry. In doing so, medicinal plants or plant extracts that are shown to be safe and efficacious could be added to the national lists of drugs for use in primary healthcare, and may replace some expensive pharmaceutical products, thus reducing overall healthcare expenditures. Global acceptance of the safety and efficacy of these products will lead to the development of industry and the improvement of living conditions, all of which will have an impact on world health. The development of medicinal plant screening programs can already be greatly facilitated by sophisticated searching techniques and data analysis of the scientific literature. The ability to produce lists of plants with a high priority for screening will maximize the potential to discover new therapeutic agents, as well as determine the mechanism of action and safety of known medicinal plants. It will also prevent duplication of research efforts, and reduce time and money required to produce safe and effective crude extracts of new natural drug entities.

It is very important to study valuation of medicinal plants to signify its economical importance and biodiversity. While using medicinal plants for commercial use, valuation of these species in particular area, taking in account its sensitivity to biological eco system is very essential. Sustainable use of plants and its benefit to local community are important parameters related with commercial exploitation of natural fauna and flora. An economical study on the line of like Faranworth and Soejaro, Principe, Mendelsohn and Ballick, Aylward, Artuso, Pearce and Purshottam needs to be carried out in India¹⁵.

10. VALUATION OF NATURAL RESOURCES

Based on above discussion regarding availability of abundant natural resources in India and its commercialisation on global level to benefit local population and Industry, it is important to correctly assess its value or worth. This is economic perspective for sustainable development of natural resources. Looking at various measures implemented in the area of green technology and subsidies available it is good proposition for Indian Herbal Industry to acquire its due share in international market. Natural resources are natural capital and there are many attempts made regarding valuation and accounting for environmental and natural resources, economic value and use value concepts are adopted for valuating these resources as Total Economic Value (TEV) and defines as the sum of use value (UV) and non-use value (NUV).

$$\begin{aligned} \text{TEV} &= \text{UV} + \text{NUV} \\ &= \text{DUV} + \text{IUV} + \text{OV} + \text{NUV} \end{aligned}$$

Where, DUV is direct use value

IUV is indirect use value

OV is option value

Work is done on valuing natural resources were done by Grey(1914),Harold Hotelling (1931) and Lotka (1956),El Serafy (1989).There studies were done in relating value of natural resources in terms of biological species,exhaustability,welfare interms of discounting rate and differentiating rating¹⁶.Various techniques by measure of opportunit cost,exchange value,surrogate market valuation and contingent valuation are adopted for developing methodology for calcuulation.Foe developing business strategy these studies can prove as guidelines along with various policy measures adopted at domestic and internation level as discussed in previous sections of this paper.Thus managing natural resources effectively by adopting flexibilities available interms of forward and backword linkages a part of business environmnet management¹⁷.A model depicting al thesefactors affecting Herbal sector of Indian Pharmaceutical industry is developed as shown on next page of this paper.All peripheral factors needs to be carefully evaluated and complied with international quality standards and safty norms for fuure sustainability of this this promising sector of Indian Industry.

PROSPECTUS

The future of traditional medicine is related with,

1. Verification of use of active ingredients in plants by modern physical, chemical & clinical technologies.
2. Work in the area of 'Green medicine' i.e. discovery of new kinds of medicinal plants and new drugs from more remote regions of world.
3. Holistic approach towards traditional medicine on the line of Chinese system of medicine.

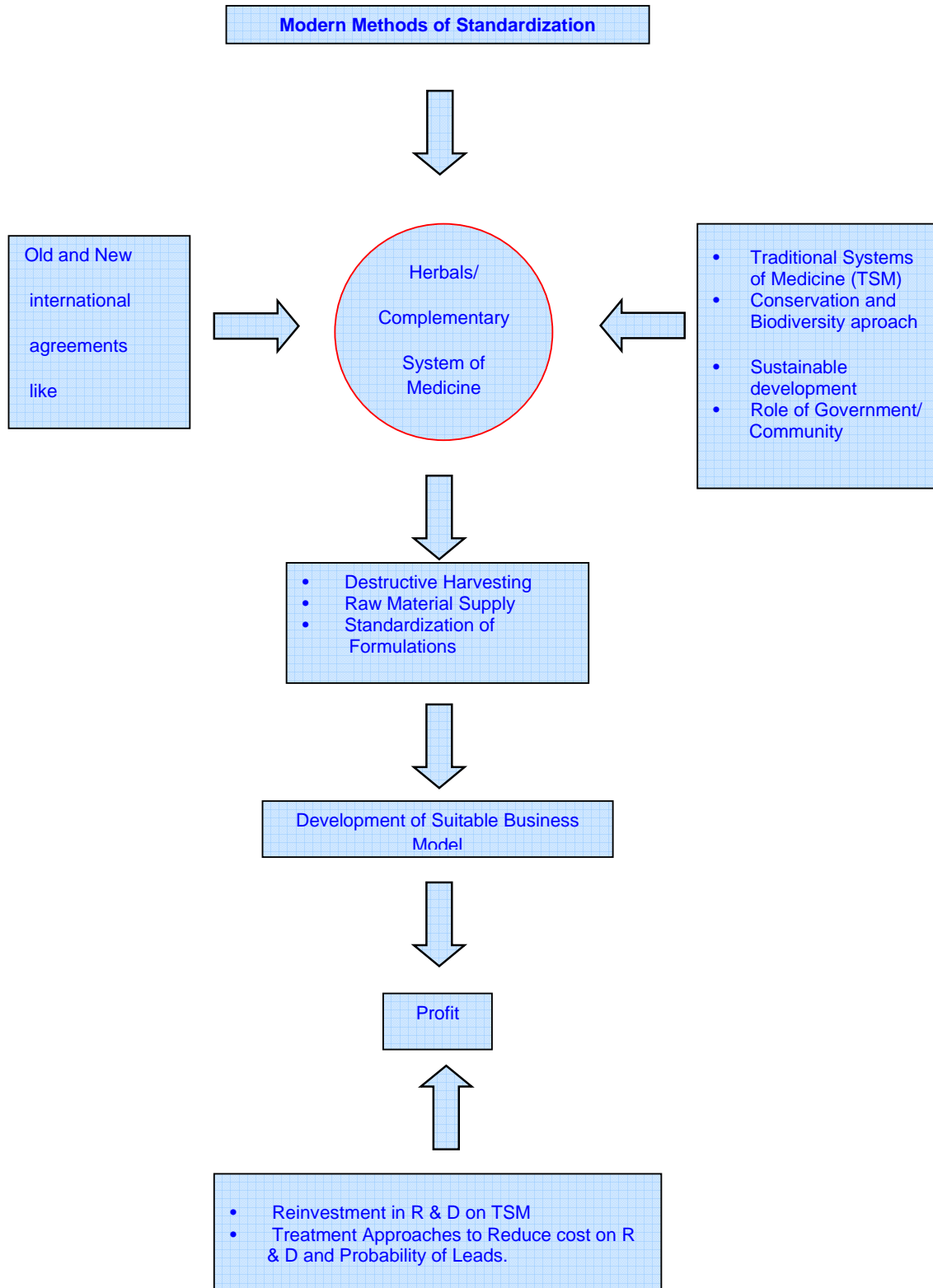
¹⁵ Pushpam Kumar, Current Science, Vol 86,10-04-2004.

¹⁶ Chary S.N.,Vyasulu Vinod, Environmental Management: An Indian Perspective,Macmillan India Limited,I Edition,2000,pp106-131.

¹⁷ Raj Agarwal,Business Environment,Excel Books,New Delhi,II Edition,2006.

BUSINESS MODEL

APPROACH TOWARDS HERBALS/COMPLIMENTARY SYSTEMS OF MEDICINE.



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