International Conference on Inter Disciplinary Research in Engineering and Technology 2016
[ICIDRET 2016]

ISBN	978-81-929866-0-9	**VOL**	01
Website	icidret.in	**eMail**	icidret@asdf.res.in
Received	19-December-2015	**Accepted**	30-December-2015
Article ID	ICIDRET006	**eAID**	ICIDRET.2016.006

Causal-loop and SWOT analysis of Indian Herbal Industry

Rahi Jain[1], Bakul Rao[2]
[1, 2] Centre for Technology Alternatives for Rural Areas (CTARA), Indian Institute of Technology Bombay (IITB), Powai Mumbai, India

Abstract: *Herbal industry is one of the globally and nationally growing industries, but this industry has not been explored adequately in the research domain. This has raised certain problems in the industry effective functioning. This study is focussed on understanding this industry Strength, Weakness, Opportunity and Threats (SWOT). The interactions with experts of this industry are done to develop this sector understanding. This study has identified various factors using causal loop diagram which are playing role in the functioning and the current state of the industry. This study concludes by proposing the Indian Herbal Industry SWOT.*

Keywords*:* Small-Scale Industries, Medicinal plant, NMMP.

INTRODUCTION

Herbal industry is growing both globally and nationally with the expected world market size to reach around Rs 334 trillion in 2050 [1]. India is one of the major players in herbal market with expected nutraceutical market of around Rs 0.4 trillion by 2020 [2]. Ved and Goraya (2008), found that the total raw drug consumption in 2005-2006 was 3, 19,500 MT. These raw drugs came from 960 medicinal plants (MPs) out of the 2400 MPs mentioned in codified systems of traditional medicines in India (like Ayurveda, Siddha, Unani) [3]. In India, herbal products have been prevalent since many millennia and has around 9500 herbal industries (Table 1) excluding cottage industries [3]. Despite, such long history of herbal products and significant industrial base, India's contribution in world herbal market is around 1% and it's industry suffers from various issue like quality and validation [4].

Table 1
Classification of the herbal units on the basis of their annual turnover

Unit Size	Annual Turnover (Rs. in Million)	Approximate number of units
Large	>500	14
Medium	50-500	36
Small	10-50	1443
Very Small	<10	8000
Total		9493

Source: Ved and Goraya (2008) [3]

Currently, the literature does not provide sufficient insight into the Indian Herbal Industry (IHI). India has made attempts to improve the IHI by launching initiatives like National Mission on Medicinal Plants (NMMP), government supply chain and amala mission, but had unsatisfactory achievements [5]. A study by Jain and Rao (2015) showed the design issues in NMMP operational guidelines [6].

Cite this article as: Rahi Jain, Bakul Rao. "Causal-loop and SWOT analysis of Indian Herbal Industry". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 26-30. Print.

The studies by Pangriya (2015) and Kuniyal *et al* (2015) showed implementation issues with various government initiatives implementation in Uttarakhand [5], [7]. A report by the steering committee for AYUSH (2012) indicated that the achievements in the targets of NMMP were far from planned targets [8]. Accordingly, in such a scenario, it is important to understand the IHI functioning for better decision making. This study provides the structural and functional analysis of the IHI.

Method

The study is performed by interacting with various industry, government as well as academic experts on IHI from various organizations and academic institutions (Table 2). The questionnaire is not standardized and is adapted on the field based on the experts response. Some basic set of questions used to initiate the interactions are as follows:

- What is the role of your organization in Indian herbal industry?
- What are the strengths and opportunities in the Indian herbal industry?
- What are the weaknesses and threats in the Indian herbal industry?

Table 2
Organization Types of experts involved in the interactions

Organization	Organization Type	Organization Work
A	Community Driven Enterprise	Small-scale herbal industry
B	Private	Large-scale herbal industry
C	Public	Government Research Institution
D	Non-government Organization	Private Research Institution
E	Public	Government Regulatory Body
F	Non-Government Organization	Rural agriculture livelihoods improvement

Result and Discussion

Types of Herbal Industry and Companies

IHI can be classified on the basis of the products developed into three types as Herbal cosmetics industry, Allopathy/pharmaceutical industry and Traditional medicinal industry. Herbal cosmetics industry uses the MPs to develop products used for enhancing the body appearance or odor. The pharmaceutical industry uses the MPs to prepare drugs for the allopathy. The traditional medicinal industry deals with products which are formulated based on the ancient texts and scriptures of Indian traditional medicines (ITM) like Ayurveda, Unani, Siddha and Homeopathy. The traditional medicinal industry can be sub-divided into Classical medicinal industry and Patent & Proprietary Industry. The classical medicinal industry prepares the formulations and products mentioned in the classical texts of ITM. The patent & proprietary industry modifies the formulations and products mentioned in the classical texts of ITM to create new products like extracts, nutraceuticals (or, diet supplements) and cosmetics.

These herbal products especially traditional herbal products could be made by different type of companies that are classified as Public Listed Companies, Public Unlisted Companies, Private companies and Producer Companies. The companies can also be classified on the basis of company ownership as public owned company, community owned companies and private owned companies.
Community owned companies or community driven enterprises (CDE) usually prefer public based unlisted company model owing to three major reasons. Firstly, this is more attractive option as compared to Producer Company for the investors and banks that could improve the company bail out chances. Secondly, a public unlisted company as compared to private company has no restrictions on shareholders number. Thirdly, share trading of public unlisted company as compared to public listed company is difficult that will help in retaining its community based shareholding. This model is preferable for businesses like processing industry with high risk, where investment cost increases with use of processing equipment and marketing. Further, a start-up with limited funds can process plants into limited intermediate forms that limit market.

However, in less risky businesses with limited funds requirement, producer company model could be considered. Example, MPs Collection Company deals with raw plants which are used by different industries in different ways so this unit will have broader market. Secondly, it only requires MPs storehouse as MPs drying and separation activities are managed by the supplier (cultivator or collector) before bringing MPs to the collection unit.

Herbal Industry Research and Dissemination

The research in IHI is done in multiple directions. Some of the major directions of research are herbal products development and validation, MPs processing, cultivation and harvesting and market research [3]. Validation of existing formulations and products is focused on understanding the traditional herbal products [9] and processes from the modern science perspectives [10] and validate the

Cite this article as: Rahi Jain, Bakul Rao. "Causal-loop and SWOT analysis of Indian Herbal Industry". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 26-30. Print.

proposed effects of traditional herbal products [11]. The information obtained from scientific understanding and herbal product validation is further used to perform research on improving the traditional processes of developing herbal products [12].
Cultivation-based research is focused on developing better medicinal plant varieties for cultivation [13] as well as developing harvesting practices of MPs [14]. Market based research is focused on understanding the market scenario of the herbal industry in India [1] and various factors which are affecting this industry in India [5]–[7].

In terms of research dissemination, different strategies are used for disseminating different kinds of research work. These strategies include publication in various journals and magazines, preparation of databases and provision of trainings. Training is commonly performed for cultivators to disseminate new cultivation practices and plant varieties with or without a platform for these cultivators to meet with their potential buyers. Database and monograph preparation is performed to disseminate various information like MP cultivation, uses, distribution, characterization [15], herbal products formulations and herbal products quality standards [16].

Role of various institutions in Herbal Industry

The herbal industry supply chain can be broadly categorized into three stages. The first stage is the cultivation stage, second stage is the intermediate processing stage and the final stage is the finished product stage. Cultivation stage deals with activities involved in collection or cultivation to the harvesting stage of the MPs. Intermediate processing stage deals with the broad set of activities that can vary from simple drying and powdering of the plant to bioactive compounds extraction and concentration from MPs and depends on the desired end product. Finished product stage deals with the preparation of the finished or the consumer product. The industry for intermediate and finished product can be either same or different.

The interactions with the experts to understand the role of different organizations in herbal sector involved in traditional medicines production. Resulted in a causal loop diagram (Fig.1). The potential demand for any industry depends on the overall product demand. The main limiting factor for the herbal industry to achieve its potential is the acceptance of herbal products by the users that is determined by various factors. Some of the factors affecting user product acceptance are product marketing, product acceptance by importing countries and doctors, convenience in product usage and product price.

Product marketing and acceptance by countries and doctors depends significantly upon good product validation and standardization research. Convenience in product usage depends on the relative convenience of alternative products. The powder/liquid form of herbal drugs intake is less convenient as compared to tablet form that is easily available in allopathy. Finally, the price plays a role as poor segment of society cannot afford costly drugs. The pricing of the drugs are dependent on the supply-demand curve where higher demand and less supply increase prices, while less demand and more supply decrease prices.

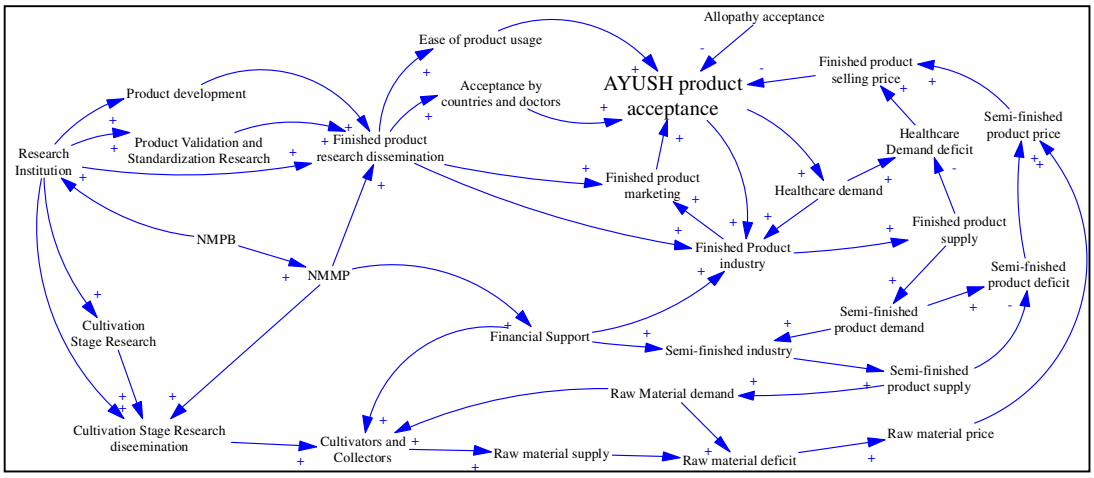

Figure 1. Causal Loop Diagram of IHI
('+': Effect is directly proportional, '-': effect is inversely proportional)

Further, the various factors affecting the cultivation stage also play a role. Some of the important factors are competition from existing crops, supply from wild and research in cultivation. The cultivators will cultivate the MPs only if it is more profitable than their existing crops. Further, the cultivators have to compete with the collectors of MPs who can sell the MPs at lower prices owing to no investment in cultivation. The higher research dissemination on product yield and quality can improve the supply of MPs to processing. This higher research dissemination is dependent upon higher research focus on cultivation stage. This focus of research on cultivation will depend upon the industry demand deficit. Further, community awareness and participation in the herbal industry can also play a positive role in this sector and one of the approaches is CDE.

Cite this article as: Rahi Jain, Bakul Rao. "Causal-loop and SWOT analysis of Indian Herbal Industry". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 26-30. Print.

Further, the support of government at all stages is considered favourable for the industry. The government support is expected in the form of better policies and regulation, linkages with the foreign countries and research. One of the government body National Medicinal Plant Board (NMPB) is involved in promoting this sector by providing financial assistance to setup the industries, cultivation zones, research and research dissemination. Financial assistance for industries, cultivation and research dissemination is done through NMMP.

SWOT analysis

The IHI Strength, Weakness, Opportunity and Threat (SWOT) analysis (Fig.2) is performed based on the interactions with experts. One of the major strengths of the industry is the availability of the large supplier base that can provide the raw materials and semi-processed products to the market. Secondly, the AYUSH product development cycle and cost is much smaller as compared to conventional pharmaceutical products. Thirdly, the information about the product formulations and preparations is available in various traditional manuscripts and these products are inherently considered safe. Finally, the stance of the government is considered friendly. Further, certain opportunities exist in this sector that can be important. It can provide avenues for creating entrepreneurs and employment creation especially with the positive government support. The availability of a large number of potential users after the AYUSH popularization can provide large market base both nationally and globally. It provides the opportunity to use the natural resources available to mankind that would have otherwise degenerated.

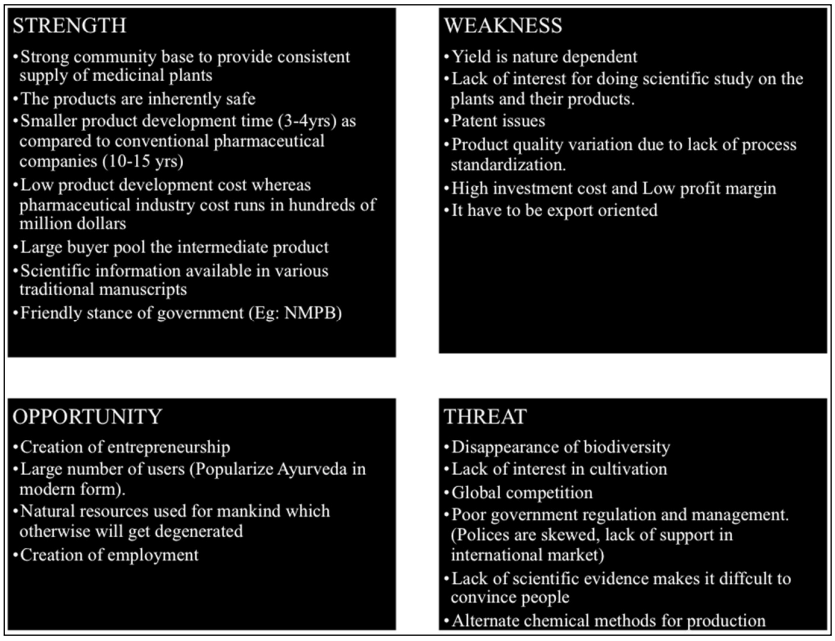

Figure 2. SWOT Analysis of IHI

However, the herbal industry has certain weaknesses that need to be addressed. In general, the industry has weak backward linkages at affects supply chain like inadequate backward linkages such as contract production and investment from finished industry to minimize the business risk. Further, despite a friendly government, industry does not find the policies and regulation adequately appropriate for sector growth. Another major weakness of the sector is the raw material supply because the MPs yield is nature dependent. This industry is marred with high investment cost, patent issues and low profit margin that make the small-scale industries sustenance tough. The industry for its sustenance need to be export oriented, but product variability and poor tie-ups with foreign countries makes it challenging to target international market. This product variability is affected due to lack of process standardization. Finally, inadequate interest regarding scientific studies impacts the product development, validation and standardization.

Further, the several threats loom over the industry. Firstly, the decreasing cultivation interest of the farmers threatens the future quality raw materials supply. In addition, the more profitable crops can make the MPs cultivation less attractive for cultivators. Secondly, the future supply of MPs from collectors is threatened by the biodiversity disappearance. Finally, increasing global competition along with poor government regulation and management, lack of scientific validation of product and chemical methods of production threatens the industry international market presence.

Cite this article as: Rahi Jain, Bakul Rao. "Causal-loop and SWOT analysis of Indian Herbal Industry". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 26-30. Print.

CONCLUSION

The study provided the overview on the current IHI regarding the type of companies and research performed. Further the study provided the various factors that are affecting this sector functioning through the causal loop diagram. This study concluded with the SWOT analysis of the sector.

REFERENCES

[1] T. P. Aneesh, M. Hisham, M. S. Sekhar, M. Madhu, and T. V Deepa, "International market scenario of traditional Indian herbal drugs - India declining," *Int. J. Green Pharm.*, vol. 3, no. 3, pp. 184–190, 2009.

[2] B. K. Kukreja, K. Soni, and K. Kohli, "Current market trends and regulatory aspects of herbal antioxidants and natural dietary supplements: A boon for health and treatment of diseases.," *World J. Pharm. Pharm. Sci.*, vol. 4, no. 10, pp. 2373–2406, 2015.

[3] D. K. Ved and G. S. Goraya, *Demand and Supply of Medicinal Plants in India*. Dehradun: Bishen Singh Mahendra Pal Singh Publishers, Dehradun and FRLHT, Bengaluru, 2008.

[4] National Medicinal Plants Board, "Centrally sponsored scheme of National Mission on Medicinal Plants: Operational guidelines," AYUSH, New Delhi, 2008.

[5] R. Pangriya, "Study of Aromatic and Medicated Plants in Uttrakhand, India: With Focus on Role in Employment Generation and Supply Chain Management," *Int. J. Soc. Sci. Manag.*, vol. 2, no. 2, pp. 148–156, 2015.

[6] R. Jain and B. Rao, "Critical analysis of India's National Mission on Medicinal Plants (NMMP) in providing access to quality botanical drugs to improve public health," *J. Ayurveda Integr. Med.*, vol. 6, no. 3, p. 198, 2015.

[7] C. P. Kuniyal, V. K. Bisht, J. S. Negi, V. P. Bhatt, D. S. Bisht, J. S. Butola, R. C. Sundriyal, and S. K. Singh, "Progress and prospect in the integrated development of medicinal and aromatic plants (MAPs) sector in Uttarakhand, Western Himalaya," *Environ. Dev. Sustain.*, vol. 17, no. 5, pp. 1141–1162, 2015.

[8] Planning Commission of India, "Report of steering committee on AYUSH for 12th Five Year Plan (2012-17)," New Delhi, 2011.

[9] A. K. Kiemer, T. Hartung, C. Huber, and A. M. Vollmar, "Phyllanthus amarus has anti-inflammatory potential by inhibition of iNOS , COX-2 , and cytokines via the NF-kB pathway," *J. Hepatol.*, vol. 38, pp. 289–297, 2003.

[10] R. Jain and P. Venkatasubramanian, "Proposed correlation of modern processing principles for Ayurvedic herbal drug manufacturing: A systematic review," *Anc. Sci. Life*, vol. 32, no. 4, pp. 205–211, 2015.

[11] J. Bhargava and Z. Y. Khan, "Comparative Evaluation of the Efficacy and Side Effects of Imipramine , Sertraline and an Ayurvedic Formulation in Patients of Depression," *J. Clin. Diagnostic Res.*, vol. 6, no. 2, pp. 220–225, 2012.

[12] I. R. Kubra, D. Kumar, L. Jagan, M. Rao, and P. Products, "Emerging Trends in Microwave Processing of Spices and Herbs," *Crit. Rev. Food Sci. Nutr.*, vol. Accepted M, no. December, pp. 1–50, 2015.

[13] G. Bagchi, P. K. Chaudhari, and S. Kumar, "Cultivation of bhumyamalaki phyllanthus amarus in India." Central Institute of medicinal and Aromatic Plants, Lucknow, p. 13, 2000.

[14] P. S. Kakaraparthi, K. V. N. S. Srinivas, J. K. Kumar, A. N. Kumar, D. K. Rajput, and S. Anubala, "Changes in the essential oil content and composition of palmarosa (Cymbopogon martini) harvested at different stages and short intervals in two different seasons," *Ind. Crops Prod.*, vol. 69, pp. 348–354, 2015.

[15] ENVIS Centre, "Encyclopedia on Indian Medicinal Plants," *FRLHT*. [Online]. Available: http://envis.frlht.org/indian-medicinal-plants-database.php. [Accessed: 12-Dec-2015].

[16] Indian Drug Manufacturer's Association, *Indian Herbal Pharmacopoeia Revised New Edition 2002*. Mumbai, 2002.

Cite this article as: Rahi Jain, Bakul Rao. "Causal-loop and SWOT analysis of Indian Herbal Industry". *International Conference on Inter Disciplinary Research in Engineering and Technology (2016)*: 26-30. Print.