

InterlinkInsight

Perspective For Business Performance

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**HOW AI WILL TRANSFORM PHARMA
INDUSTRY**



FROM THE PUBLISHER'S DESK

Industry is shifting its core to innovative technology, delivery systems, aligning with patient centric approach, access to different markets with obviously “medicines”. This Interlink Insight has a glimpse of all.

Wish You all best for growth in FY 2019-20.

The booming technology of this decade – **Artificial intelligence**, is progressing rapidly and is successfully implemented across various sectors. Implementation of AI coupled with machine learning is solely dependent on data that has already accelerated the productivity of various departments of pharma industry.

There are boundless opportunities cropping up with **technological development in nutraceuticals** industry. In this fast paced world, to cope up with daily challenges we often miss out our health. Well, health and fitness awareness are creating the demand for high- performance nutraceutical ingredient and is leading the market. Further tying-up logistics of nutraceutical business with e-commerce companies will further expand the demand in coming years.

With recent developments in generics, generic-branded and branded drugs, the question that arose was **can brands be developed in india** now? Indeed a robust product differentiation and segmentation, maintaining brand promise and performance proved to be the key in today's scenario of drug marketing.

The **pharmaceutical sales** has been always dynamic because of economic and regulatory changes. It is fascinating to observe the way sales management has tackled and adapted to measure up to the organizational requirements.

On the other hand, in pharma the API industry plays most crucial role. The Indian API market holds almost 8% of market share in global pie. 30% of produced API are imported to western countries, thus there is huge scope for domestic **API market** to extend its footprints.

Well with all those developments in industry, pharma still needs to work on its **business models**. Looking at recent innovations, ecosystem and subscription model are the key business models in industry that are quite significant in attracting value. Wish you all thoughtful reading!

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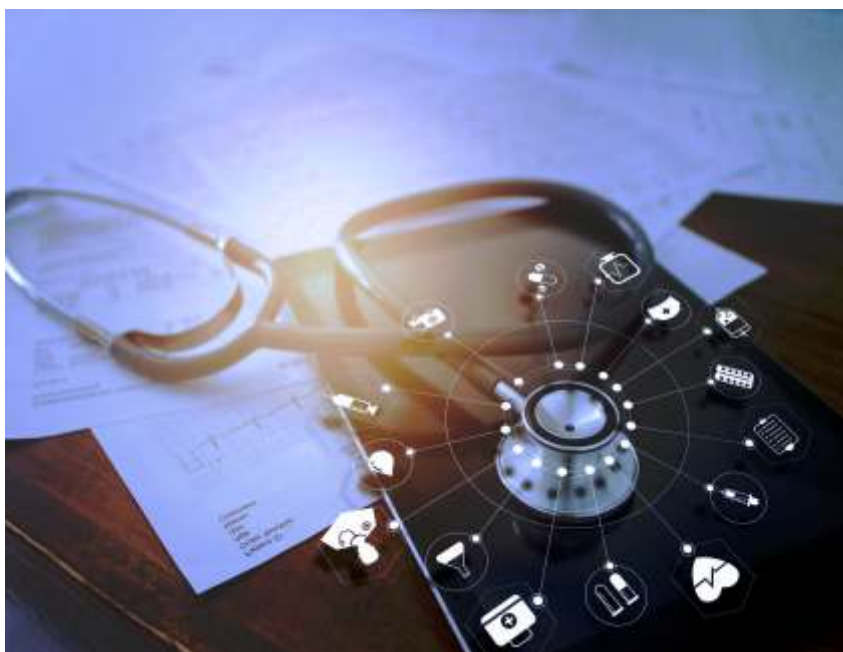
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How AI will Transform Pharma Industry



Artificial Intelligence (AI) seems to be kind of science fiction, but it's not. It is a real science based upon machine learning technology that is driving entire world towards automation and sophistication. It's very crucial to understand the basics of AI and conceive the concept behind its application. Once the concept is clear, it guides towards right questions and help in deciding concluding factors that guides on the way to learning machine. - By **Dr. R. B. Smarta**

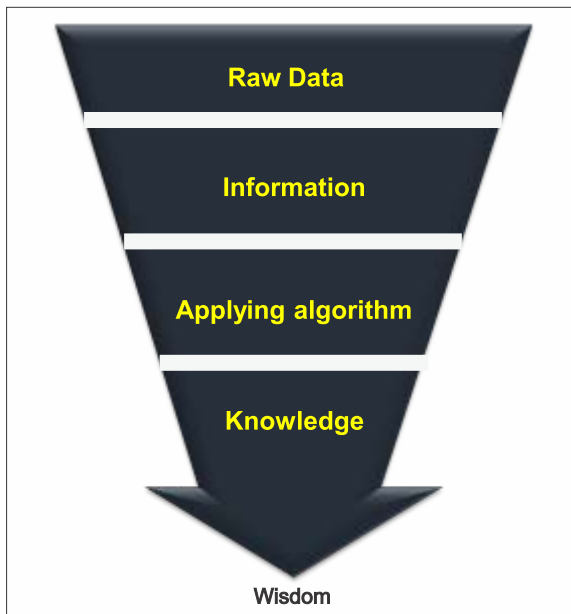


God is in details and data:

Though AI has become fad across industries, the technology's implausible computational power, real applications begins with on ground data. The potential of AI certainly depends on data; the underused asset of organization, which is usually underestimated. The foundation of AI solely depends on the data, in the right formats, and in the right quantity and quality. In case, if documentation is manual and consists of various variances, the data is disordered and to convert the data into a common format and import it to a common system takes lot of time, further to which this formatted data can be used to build models.

The new pharma competitors belonging to e-commerce industry like Google, Amazon conquered their industries because they were the first to structure data sets. Now, their data sets have become so large, and data collection and analysis are so sophisticated, that it enables them to grow their competitive advantage.

This helps in understanding and controlling the variable from initial phases itself. The process starts with compiling raw data, translating data into information that provides knowledge and ultimately wisdom. More the data you have, better is the algorithm of AI and would result in getting more reasonable results. In many cases, AI techniques are based upon lot of data, on which the algorithm is accomplished to form models letting it to function over new data. For these techniques, data is vital, as it depends on the quality and quantity of the data.



Source: Interlink knowledge cell

Fig. 1: Process of transforming data to wisdom through AI

Case study: Amazon an excellent example of ambidextrous organization, constantly looks at improvising its current business while applying new innovations to upgrade technology and services. Amazon was one of the first to apply AI to increase its product recommendations and work towards upgrading customer experience. Further, application of machine learning enabled the Amazon team to improve product forecast and empower popular products like Alexa, Amazon Go Store and Amazon recommendation engine.

Converting data to algorithm:

Machine learning is a subset of AI and is the scientific tool aided by means of computer system. Algorithms and statistical models are applied on the set of data to analyze and accomplish tasks without giving real time instructions. Machine learning brings faster, more accurate results, and enables us to identify profitable opportunities or risks. Combining machine learning technology with AI and other cognitive technologies can simplify the process of analyzing large data of information.

The keystone is that machine learning can be applied to two different types of learning; namely supervised or unsupervised learning. Thus, your thought process should be able to categorize the issues in either one of them.

It is like, in case of supervised learning, you give input that is dataset to algorithm, and the output format is known because of relationship between input and output. Whereas, in case of unsupervised learning the input variables are not known and even how output should look like is unknown; thus, clustering the data into various subsets is the issue of this learning.

Example: In case of a clinical experiment, that aims to forecast whether someone is going to develop myopia based on certain physical measurements and heredity. In this case, the input dataset would encompass the person's medical characteristics and the target variable is binary: 1 for those who are likely to develop myopia and 0 for those who aren't. Now, if you already know the value of the target variable i.e. you know if they were myopic, then this is termed as a supervised learning problem.

What is algorithm in AI:

Algorithm uses various methods to analyze the data set, it includes decision tree learning, clustering, and inductive logic programming.

- Decision tree learning is used as a predictive tool, that helps in observational mapping of any item to provide output about the item's target value. Decision tree mimics all imaginable paths that an individual can follow. They actually design a "map" of all possible paths along with the equivalent output in each case.
- Clustering is a way of analysis that segregates the observational data sets into various clusters or subsets for analysis of statistical data. By this way, the

observations that have same outputs based on certain predecided criteria belongs to same clusters, while other which are not similar belong to different clusters depending on the predecided criteria. Clustering techniques depends on assumptions and structure of the data that you have, depending on the metric or pattern.

- Inductive programming considers logical programming and is a correlated field that contemplates any type of programming languages to represent hypotheses. Just you have to provide the encoding of the known background knowledge and a set of databases, the inductive logical programming system will analyze and derive a hypothesized logical program that includes all positive and no negative examples.

Applying AI in R&D:

It is assessed that on average an academic researcher reads 250-270 articles per year. You can just imagine how difficult it would be for a researcher to correlate, integrate, link and get insights from all this data sites. What AI does is, via cutting edge algorithms it interprets and structure the data. And given that over 50 million scientific articles exist worldwide, it is not possible for an individual to get through all relevant articles. AI and machine learning speedily and efficiently enables the analysis of the sum of all scientific knowledge. By means of AI, the prof. Jackie Hunter and his team were able to generate 200 hypotheses which was further brought down, using in-silico validation to 20 novel hypotheses. Eventually, it was carved down to five hypotheses which were further tested in an academic lab. This process which usually takes months, has allowed the team to discover the latent new mechanisms for disease modification in timeframe of few weeks.

AI is assisting in transforming the existing drug discovery process and can acclimatize towards newer technologies. The newer technology is upgrading pharma industry to augment the work of scientist in field of R&D and enable them towards effective understanding which can direct towards smart innovations.

AI in R&D is not only about producing new drug formulations for patients, but it's also a matter of how AI platform will access the patient's medical records, genetic markers, analyze data from wearables and how well it will predict the health conditions before they become serious and go beyond hands. In this case, AI is enabling in making customized medicines to behave proactively.

In case of pharmaceutical formulations, though it looks like the formulations are designed by means of ratios of ingredients and are combined but it also depends on other processing conditions. In the past, while designing the formulations, scientists used to apply statistical techniques to model their formulations, depending on response surfaces that offer a mechanism for

optimization. Still using a statistical technique for optimization can fail, especially in case of complex formulation. The recent advancement in mathematics, computer science and algorithms have made the development of drug modeling, data mining and formulation techniques work with a wider range of data sources: neural networks, genetic algorithm and fuzzy logic. Neural networking enables to mimic the processing of the human brain; genetic algorithms attempts to imitate the evolutionary process by which biological systems self-organize and adapt, and fuzzy logic mimics the ability of the human brain to conclude and generate responses based on incomplete or indefinite information.

AI in Manufacturing:

Pharmaceutical manufacturing plants are operational on computerized programmable machines, these plants operate under fixed operating parameters. Well, the new AI technologies can simplify the working of those complex operations by means of machine learning. In case, to apply AI the challenge that industry faces is of policies and regulations of following good manufacturing practices (cGMPs).

Thus, machine learning ensures to combine GMPs with AI, by this algorithm can identify any discrepancy within the process. Hence, by enabling machine learning technology, various sub-processes of manufacturing inclusive of granulations, mixing, compression, chemical synthesis can be improvised based on real-time data that will ensure quality of the in-process bulk. These machines will continuously trace and track & control the parameters of processes. The difference between existing automated machines and machine learning would provide endless composed data that will help in making informed decisions on real-time basis. The collaboration of robotics and AI will therefore transform the entire pharma operations.

This machine learning technology in future will take complete charge of manufacturing operations and would be inclusive of:

- Data acquisition and supervisory controls for real time assessment. This would be in compliance with Process Analytical Technology (PAT) – thus, there won't be any need of testing and continuous quality assurance for individual units.
- Process forecasting and predictive maintenance in collaboration with sensors, will track the operating conditions and performance.
- Hassle free audit to identify non-compliances that will help in identifying the root-cause(s) and direct towards decision making.
- At one go, starting from manufacturing to shipment the data is collated within minutes to analyze and identify non-compliance.
- Manual procedures will be limited and auto-controlled processes would result

in reliable process-related data.

Further challenge is to validate and integrate the technology to content the individual manufacturer needs and approval from health authorities, such as USFDA.

No doubt that modern manufacturing companies are under commercial pressure to evolve and react to transforming environment by introducing new disruptive manufacturing processes.

AI in Sales & Marketing:

Machine learning is applied in pharma sales division to segment the customers, letting sales teams to customize their activities. Based on doctors' interest in therapy segments, new drug molecules, location; segmentation can be done. AI can assist the medical representative to recommend the products based on sales history and make them easily available. Based on sales history medical representative can plan a well strategic visit by getting equipped with relevant drugs and impact positively with personalized messages in less time period giving them the confidence to crack more deals and lift sales. This helps to reveal individual preferences, frequencies, and timing of information.

Case study: Novartis has employed AI to develop their medical representatives in case of custom messaging and they ensure that they speak about the things that doctor is interested in. Pfizer at Australia in collaboration with Complexia in 2017, designed an application enabling sales and marketing strategies to resolve tricky 'what-if' scenarios.

AI in Logistics:

AI has smoothened the management of logistics. It provides real time analysis, which helps to regulate new factors that affects the performance. To identify various factors and issues affecting the performance; supervised learning, unsupervised learning, and reinforcement learning can be implemented. Just for example, supervised learning can identity scam and can predict before hand, while reinforcement learning can simplify real-time decisions by providing relevant data. IBM's Watson is a live example that combines AI and analytical software for optimal performance in supply chain management.

AI can assist in profiling and analyzing supplier's data including delivery performance, inspections, audits, credit scoring and delivery information which can be used for decision making and improve customer services.

It also enables forecasting with accuracy. As we know, logistic management is ambiguous management with many variables. AI has empowered tracing and tracking of all the variables that would improve accuracy in demand forecasting. Depending on the consumption of stock from sales value, weather, location and considering other factors, endless loop of forecasting can be predicted. Knowing all this information, it could reshape the warehouse management with

self-managing inventory system and autonomous ground vehicles.

Today technology is playing a noteworthy role in advanced supply chain and logistics management, leading transparency, efficiency, and automating various tasks for supply chain managers and planners as well as providing clarity across supply chain partners.

The mutual application of AI is to relate and analyze unstructured data and provide actionable insights and predict an outcome with greater accuracy.

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Dr. R. B. Smarta- *Founder and Managing Director of Interlink Marketing Consultancy Pvt. Ltd. Being a thought leader in Pharmaceutical, Nutraceutical and wellness industry, he has been contributing globally through Interlink Consultancy and building business performance of his clients since 33 years. Having a Master's degree (M.Sc.) in Organic Chemistry in Drugs, MMS in Marketing, PhD in Management, and FRSA (Fellow of Royal Society of Arts) London, he is-perusing his passion of converting science to Business.*

Besides being a consultant, he has been teaching at IIM, prestigious management institutes, Pharmacy College, Pharmacists Associations, guiding PhD students and written as many as 7 Books on Management, Pharma, Nutra, Foods domain, and many articles in prestigious journals/magazines.





Nutraceutical Ingredient- Technology +



Rise in connected consumer with digital and online innovation has surged consumer demand for “more nutritious”. With these customized demands, consumer's choice of purchase and consumption has been on forefront in this Nutraceutical business. In near future, this marketplace will be enhanced by innovation & technology and will be more aligned with individual needs and desires. – By [Interlink knowledge cell](#).



The popularity of Nutraceutical ingredients is soaring as rising health concerns are likely to drive the product demand in coming years. The demand for Nutraceutical ingredients is booming as it is perceived to be healthier and more effective compared to synthetic products. Many people now start their day by popping up a multivitamin tablet and eating yogurt for a good dose of probiotics. As a result, the global Nutraceuticals ingredients market is forecasted to grow up to USD 49.02 Billion (by value) by 2023 with CAGR of 7.5% from the present share of USD 34.06 Billion (by value). If we look at the demographics then Asia Pacific is likely to be the fastest-growing region.

Although the market potential and number of consumers have increased, so as the competitors! The companies are hoping to go ahead in 2018 by embracing new trends in quality and innovations. Consumers are demanding for more ways to get nutrients than just pills which is opening up a new consumer segments for the market players. The demand for high-performance natural ingredients used in Nutraceuticals is driving the market. Similarly, adoption of e-commerce is further likely to augment the demand for nutraceuticals over the forecasted period. As a result, market players have been trying to expand their competitive profile by setting up technology development and innovation centers for new product development.

Nutrigenomics: Technological advancement at molecular level:

Nutrigenomics, broadly speaking, studies how diets influence genes. It deals with customization and personalization of nutrition. Many of the Nutraceuticals players have been springing up to offer customized products.

Nutrigenomics is a much bigger field to be covered by the market players. Companies are offering varied products like test kits (which will analyze which supplement may be right for customer) and tailor-made Nutraceuticals supplements and formulations.

Recently Herbalife has launched their first personalized nutrition product in South Korea. Nestle has also been extensively exploring this sector since years and recently launched Pure Genomics Program with the help of Atrium Innovations.

Technological developments in ingredients:

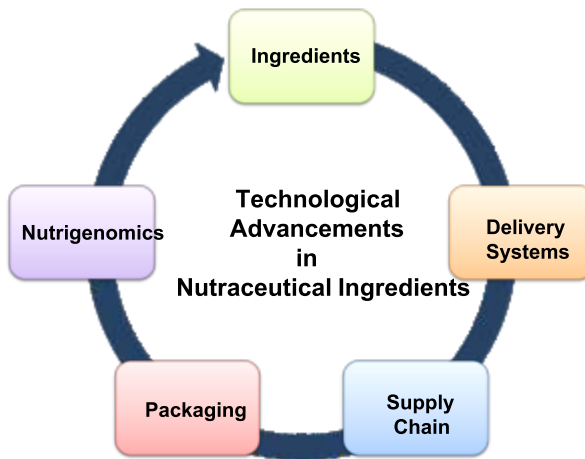
Innovation in the Nutraceuticals ingredients is increasingly focused on the micro minerals like fat-soluble vitamins (vitamins A, D and E); water-soluble vitamins (vitamin C, B1, B3, B6 and B12), and macro minerals, such as calcium, magnesium and potassium, and trace elements like iron, chromium, zinc, iodine and selenium. Although these elements have been a part of our diet, multiple beneficial properties these elements have for humans, highlighting antioxidant powers, to improve the cardiovascular system, stimulating the immune system, bone tissue and nervous system has made Nutraceuticals players to focus on them.

The group of substances with health claims like prebiotics, probiotics polyphenols, beta-glucans, fibers, oligosaccharides, fatty acids omega 3 and 6, fitoestoroles / stanols, stilbene (trans-resveratrol) anthocyanidins, superfungus and superalgae are in the wish list for innovation.

Additionally research is going on for the superfoods like shiitake (*Lentinula edodes*) which is rich in beta-glucan and particularly used to combat metabolic syndrome. Also among algae like alga Nori especially is been studied and marketed for wide and varied health benefits. Also, for the development of innovative formulations, superfruits like pomegranate fruit, blueberries, aronia or goji berries have been used for the health benefits they provide. Researchers are also actively working on ingredients like **supercereals** (chia, amaranth, and quinoa) and superbotanicals (extracts of aloe vera, ginkgo biloba extract and ginseng extract) as they provide unique health benefits.

Compared to past years, people are concerned with getting a lot more protein which is independent of how often that person hits the weights at the gym. But they're turning away from traditional animal sources of protein. As a result, in 2018, both protein sources and finished products have reflected innovation. Plant-based protein has been a vegan/vegetarian necessity for years, but trendy insect protein is now hitting the shelves.

Innovation in Nutraceuticals will increasingly be focused on the “**innoingredients**” as mentioned before but the core attributes like high purity, high toxicological safety, high bioavailability, very broad applicability and multiple health effects are needed to be examined thoroughly.



Source: KPMG Pharma 2030: From evolution to revolution

Fig. 1: Technological Advancement in Nutraceutical Ingredients

Technological development in delivery systems:

As the target market for Nutraceutical ingredients has expanded to include different ages, both the oldest and youngest consumers seem to share a common problem – an aversion to taking pills. In an effort to remove pills from the equation, companies have experimented with convenient and more diverse delivery methods. Consumers that do struggle with conventional delivery forms like tablets and capsules are demanding for chewable, ready-to-mix powders and liquids. Other new forms are in demand which include lotions, sprays, gums, drops and lozenges. In recent years, there has been technological development in gummies around using gelling agents (pectin or modified corn starch) in place of gelatin so as to cater for vegetarian or vegan consumers. Similarly, chocolate gem technology is invented to deliver a range of Bioactives, from vitamins C and D, to melatonin, probiotics, turmeric and many more.

Some of the most promising edible delivery systems designed to meet the challenges faced by the Nutraceutical industry is Encapsulation. Encapsulation is carried out in the different delivery forms like Liposomes, Microemulsions, Nano-emulsions, Solid lipid nanoparticles, Multilayer emulsions and Biopolymer particles. When curcumin is widely accepted in Nano-encapsulation form following are some upcoming trends:

1. Food protein-based encapsulation

Besides being a vital macronutrient, proteins show unique functional properties to form emulsions and gels. This property of proteins has opened up new avenue for R&D to formulate protein based encapsulation of bioactive compounds. Based on this knowledge, proteins are used as a base for the development of delivery systems in the form of hydrogel and micro or nano- particles.

2. Resveratrol encapsulation in grape seed oil

Resveratrol (polyphenol) is well-known for its antioxidant properties and its encapsulation with grape seed oil (biopolymer) prevents it from oxidative degradation. Recently, this covalent interaction between polyphenols and biopolymers has been used to formulate encapsulation for many ingredients.

3. Plant essential oils with Nano-carrier

Plant essential oils have high antimicrobial efficacy hence they are considered as an alternative of health hazardous synthetic preservatives. Applications of nanomaterials as a carrier agent for essential oils have recently gained momentum. These nanomaterial forms help to reduce the oxidative degeneration of essential oils. Solid lipid nanoparticles, micro emulsions, Nano emulsions and liposomes are some of the forms which have been currently used in encapsulation system.

Capsugel's Duo Cap (capsules within capsules) has been used for combination of products for effective delivery of different ingredients or dual release of single ingredient.

With rise in innovations, it has become necessity for manufacturers to ensure that their new delivery forms can actually be absorbed by the body and it should be always supported with the safety and efficacy data.

Technological developments in packaging:

New technology is revolutionizing the way nutrition companies do business. To sustain the market competition it has become necessary for the market player to understand and evolve with consumer trends like sustainability, safety, on-the-go mobility, single use, etc. Similarly, the expanding reliance on e-commerce has created the need for products to stand out on crowded shelves in Nutraceuticals space.

As a result, smart packaging has created increasingly sophisticated ways for companies to build relations with consumers. These smart packaging are providing an easy access to information when consumer wants to know bit more about the products.

Technological developments in supply of nutraceutical ingredients:

Essentially, qualifying suppliers and Nutraceutical ingredients is a way to assure consumer what he gets and what he orders. This is important especially in an industry that's traditionally been plagued by adulterated ingredients. When raw ingredients are contaminated and the final product has an adverse effect, this comes back on the nutraceutical company.

So market players are taking help of “Blockchain technology”. “Blockchain” is an emerging buzzword in the digital realm. The technology leverages data to improve business efficiencies and supply chains, and it holds great promise for the safety of the ingredient. As per researchers, Blockchain will help to give consumers unprecedented information about where their ingredients come from.

These technological advancements, industry specific innovations and best practices for supply chains hold a scope for nutraceutical ingredients market to grow manifolds in coming years.

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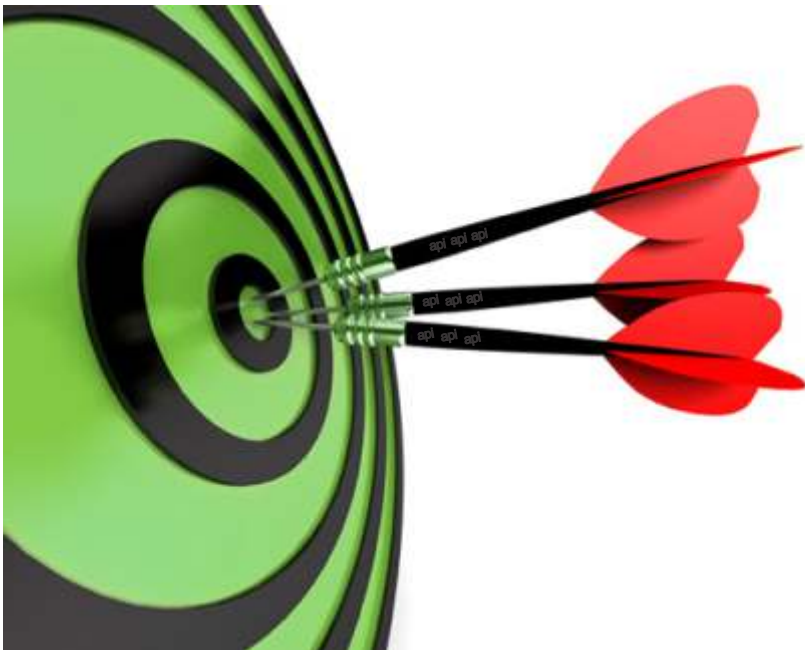
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API Focus- Challenges & Opportunities



The Active pharmaceutical ingredients (APIs) are one of the most crucial parts of every formulated end product and also of the entire pharmaceutical industry. The current global market situation, where the block buster drugs are going off patent and R&D costs have been constantly increasing, rising cost pressures and growing demand for generics is leading to increase production outsourcing and are currently driving growth of the industry.

- By [Interlink Knowledge Cell](#)



The Active pharmaceutical ingredients (APIs) are one of the most crucial parts of every formulated end product and also of the entire pharmaceutical industry. As per the industry report by marketsandmarkets, the global API market currently is estimated to be USD 182.2 billion and is projected to reach USD 245.2 billion by 2024 growing at a CAGR of 6.1%.

The domestic production of API valued approx. USD 11 billion in 2016. This market would grow at CAGR 9% during the period of FY 2016-2022. Out of this, more than 30% of API are exported to US, UK, Japan, etc. in FY 2016, API market of India had 8% market share in global API market. Looking at the imports, 57-60% of the APIs are imported from China. Remaining imports are done from countries like Italy, Germany, Malaysia, and others. This indicates that there is huge scope for the domestic API market to grow.

There has been a steady rise in the API players in the emerging economics like India and China. Apart from India and China, now South East Asia (SEA) countries is growing rapidly and turning as powerhouse for APIs and generics. Countries like Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor Leste and Vietnam are planning to grow with the help of pharma APIs. Out of all SEA countries, Thailand and Indonesia are major countries that contribute towards Indian pharma market.

Government initiatives:

The Indian Government declared 2015 as the 'Year of APIs.' This led to increase awareness amongst the public about APIs. Further to develop API & R&D centers, government is assigning lands in several states to develop API Mega Parks, and increase asset in R&D to lift up the industry. These initiatives will further drive the growth of the Indian API industry.

The novel thought of API Mega Parks has been revolutionary in Indian Pharma industry. These parks are having facilities like Effluent Treatment Plants (ETPs); Testing Facilities; Captive Power Plants/Assured Power Supply by State Systems; Common Utilities/Services such as storage, testing laboratories, IPR management, designing, etc.

The Pharma Vision 2020 initiative is intended towards creating India as a global leader in manufacturing end-to-end drug and APIs. To boost investment, India has planned to reduce approval time for new facilities. The government is also taking efforts to put down the 3As in place that is affordability, availability and accessibility. Apart from this, the Department of Pharmaceutical has planned to launch a venture capital fund of INR 1,000 Crore. The objective is to provide financial support to the start-ups in the pharmaceutical industry, to carry out research and development of novel ingredients and formulations. This would encourage the domestic pharmaceutical industry to begin or upgrade their existing manufacturing facilities.

Impact of closing Chinese factories:

Indian drug manufacturers which import APIs from China have experienced a sudden escalation of prices of raw materials. This situation has risen after Chinese government banned production of many API producing plants pertaining to quality issues. Some of the issues that were raised by FDA mentioned that the companies

were not doing stability studies for API and could not prove the reliability of manufacturing procedures that met their predetermined quality standards.

Few of the companies supplying APIs to US after quality inspection were found to be non-compliant with GMP, hence banned by US Govt. As a result there was price escalation in the range of 15-80% due to crackdown of the local Chinese companies.

As per recently published article in Pharmabiz, India is dependent on China as well as intermediate APIs for its APIs since it saves 15-20% of cost on importing raw material for the Indian drug makers.

However to minimize the imports from China and to become self-sufficient as well as to have capacity to export APIs and Intermediates to other countries, India is building system for manufacturing of APIs.

API manufacturers in India are making efforts to strengthen their marketing capacity in the regulated markets by upgrading quality, increasing production yields, altering production processes and are trying to enter into new regulatory markets.

Segmentation of API market:

The domestic API market is segmented on the basis of type of API, either into chemical or small molecule API and biotech API. Looking at market perspective APIs are segmented into chemical APIs and biotech APIs. As per FY 2016, chemical APIs accounted for 70% of the Indian API market. As the biotechnology is booming across the world now, many of the pharma companies are now looking at biological molecules in the pharmaceutical industry. Increasing complexity of healing the diseases is one of the reasons to drive the biotech market. Thus, the segment of Biotech APIs will substantially expand in the coming years. The therapeutic areas that are contributing to growth of API include anti-infectives, cardiovascular, hematopoietic, central nervous system, respiratory system and others. Out of these therapeutic areas 32% of major share is occupied by anti-infectives, 24% is occupied by cardiovascular and hematopoietic system.

Mergers and Acquisitions:

One of the reasons for growth of this industry is mergers and acquisitions. This helps to increase their existing capabilities and fortify them to reach to the newer markets with broader portfolio of products. Various Indian firms are also looking at larger pharmaceutical firms, MNCs that are viewing at emerging markets to enter into licensing deals to license out their products. At global level merger and acquisitions bring forward lot of opportunities to acquire products and to grow their business. For illustration, the merger deal between Sun Pharma and Ranbaxy has been the biggest deal in the Asian pharmaceutical industry.

Opportunities & Challenges:

Developing next generation APIs: Today Indian API industry hold its major stake in generic drug market. Looking at future needs, if government increases the budget for R&D, then pharma experts can work towards development of novel API's like ionic liquids. Ionic liquids are chemical compounds with high biological property, making them significant entity in modern science. They can prove to be a potential

player in the fields of synthesis and catalysis, extraction, electrochemistry, analytics, biotechnology, etc.

S. No.	Company	Acquired company	Year	Deal value (US\$ Mn)	Purpose
1.	Zydus	Zoetis (Some brands and manufacturing operations in Haridwar)	2016	Undisclosed	To expand animal health business in India
2.	Cipla	InvaGen Pharmaceuticals Inc. and Exelan Pharmaceuticals Inc.	2016	550	To scaleup US business and launch pipeline of products in respiratory and injectables, among others.
3.	Lupin	ZAO Biocom	2015	Undisclosed	To enter the Russian pharmaceuticals market
4.	Cadila	Zydus	2015	7.34	Intent to make Zydus its 100% subsidiary by acquiring 50% stakes of Zydus from BSV pharma
5.	Torrent Pharmaceuticals	Zyg Pharma Pvt. Ltd.	2015	Undisclosed	To strengthen market of dermatology in US & Europe
6.	Strides Arcolab Limited	Sun Pharmaceutical Industries Ltd.	2015	24.91	To consolidate the CNS business in India
7.	Cadila	Claris Lifesciences	2015	564.40	To acquire generic sterile injectables business of Claris
8.	Lupin	GAVIS Pharmaceuticals LLC & Novel Laboratories Inc. (GAVIS)	2015	880	To expand US Generic business, broaden Lupin's pipeline in dermatology, controlled substance products and other high-value and niche generics.
9.	Abbott	CFR Pharmaceuticals	2014	2900	Increase generic capabilities in emerging markets
10.	Strides Arcolab Limited	Bafna Pharmaceuticals	2014	7.87	To acquire majority stake of Bafna's branded generic business
11.	Sun Pharma	Ranbaxy Laboratories Ltd	2014	3200	To expand market reach and manufacturing facilities globally

Fig. 1: Major M&A deals

- **Revival of generic drug API market:** Currently in Indian market, the generic market is dominated by branded generic drugs. This has actually blocked the sales of unbranded generic drugs by small or medium scale manufacturers in India. Yet, the reinforcement of Jan Aushadhi Scheme and Free Essential Drug scheme by the state & central governments would be an opportunity for the domestic generic players.
- **Focus on emerging therapeutic segments:** The growing population of Gen X & Baby boomers in the country plus increased awareness about health among people is causing an upsurge in the demand for new medical products. Areas such as cardiovascular diseases, oncology, diabetes, respiratory disorders are amongst the top illness and can be the potential focus segments. Research experts need to focus on these illnesses as opportunities for growth.
- **New export markets:** Stringent quality control regulations in the US, EU markets are acting as barriers for various API exports by India. Major of India's API export revenues are made from these developed markets. Markets such as

Gulf Cooperation Council, Japan, and Commonwealth of Independent States still remain untapped. For instance, India's existence in the world's second largest pharma market, Japan, is only 1%. Nevertheless, the capability of Lupin to fruitfully create its footprint in Japan is a case study to inspire companies to explore other regions.

Way forward:

- Though China has increased prices of APIs, large quantities of APIs are still being imported from China. To alter this situation, the import fees of APIs should be raised in line with other counterparts. Consequently, this will decline imports of APIs while the domestic API market would get promoted.
- A single committee of various government departments should be formed to regulate the API industry through a single window and audit of plant, as this will streamline the process for new or for renewal of licenses.
- To differentiate self from other nations globally, make use of talented people to implement modern technology that can help enterprise to reduce cost and time to offer classy products and services.

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Business Focus- Progress or Perish in Pharma



The Industry is passing through a paradigm, but it is undergoing transmutation rather than transformation. A time has come now that to run a company, one has to strengthen its business model. Till the date industry is sustaining on its old model of innovations in product, its manufacturing and distribution. It has become necessity now to convert mere innovations into the value creation. Hence, one should also align the strategies towards Affordability, Availability and Accessibility (3As). – By Ms. Titiksha Shinde.



Global market dynamics and growth issues:

Is pharma industry really transforming?

Earlier block buster pharma business models have become reductant and investors who were ready to fund in R&D to create new block busters are apprehensive due to the uncertain outcomes. As a result, high risk in returns on pharmaceutical R&D has been seen with concern by organizations as well as investors.

All over the world a new trend of digital networking is seen through strategic alliances at different levels as per industries digital maturity. Basic aim of this networking and relationship is to centralize customers needs, optimize cost and speedy market growth.

Although the pharmaceutical value chain starts with migration of value from new chemical entity to market and ultimately to patients, it is becoming imperative that patients are not only the receiver of this value chain but they are at the centre. Each country has its own unique load of diseases and each government as well as regulatory authority need to ensure that patients of those countries get relevant and cost effective healthcare either through co-payment or sometimes taking care of their needs in totality.

Is Pharma a Disruptive industry?

The reality is that in upcoming decade the breakthrough innovations will occur not only towards product side – but will also in favor of technology implementation at manufacturing and logistics level. Redesigning the business model to address care, keeping 3As in mind- availability, affordability & accessibility has become imperative. Innovation in business model depends on entrepreneurial as well as intrapreneurial spirit, on failures, successes and learnings. Stepping further towards business innovation leads to introducing efficiency in delivery of the product or service, in cost control & maintaining customer experience. In case of big pharma companies, product innovation has become a strategic move to command and control the business model. It worked by sustaining the old model and bringing in innovation in product and its manufacturing & logistics.

Strengths of Pharma industry is in R&D, - discovering new drug molecule, developing new cutting edge medicines - manufacturing, marketing, distributing and selling. The traditional “pay per pill” led to high out of pocket expenses, increased financial instability and disruptions. Day to day new regulatory reformations & alteration in financial plans, are streamlining the systems and processes to make it consumer centric. Today competitors of pharma industry do not belong to only pharma sector but are from varied industrial backgrounds. The best example of this is Google and Amazon.

Hence, the shift is from generics to differentiated generics and further towards future medicine. Selling will be guided by digital platform dialogues to transform prescription generation to value. Also the thought leadership virtual platforms and the customer perspective will be transformed from 'treatment' to 'prevention and treatment'.

Business innovation:

Value migration business model is slowly evolving as industry is refocusing on customer centricity to have a better clinical outcome and value. This value migration business model will help in gaining value by shifting current core business to new business designs that assist to capture customers' priorities. On one hand, pharma business model needs innovation to establish affordability and accessibility and improve customer experience and on the other hand, taking product into consideration, innovation in technology to make product perform better and user friendly would be appreciated.

Today, business value is created by means of partnerships, mergers and acquisition, technology based synergies, operational excellence in sales and marketing and by applying new market access design. It is observed that saturated and disruptive industries follow ten different new business models to survive and progress in this competitive world. Out of which two business models can be very well followed by pharmaceutical industry. The new models that are trending are subscription model and ecosystem model. For eg. Subscription model is followed by Netflix and Amazon, whereas ecosystem model is followed by Google and Apple.

This transformation is shocking as these new industry entrants are non-pharma, hence pharma innovators keeping value as cornerstone are looking at development of new business models linked to 3A. They are realigning their business model innovation to sale principles of accessibility, pricing, enablement and customer satisfaction and by means of user friendly mobile and wearable devices and other IT devices. It's a fundamental innovation that will streamline the systems and processes towards long-term customer engagement.

Subscription model:

Many healthcare disruptive companies are now applying a subscription model to survive and also gain high Return On Investment (ROI). For example, a Google-funded start-up 'Forward' located in San Francisco runs a wellness clinic using AI and connected tools as that of high-end gym. Users are supposed to pay \$149 a month and are provided with healthcare facilities like unlimited genetic and blood testing, wellness and nutrition counseling, ongoing monitoring by means of wearable sensors, support and access to its AI and 24/7 access to medical staff through the app.

Another example is Push doctor- Subscription model of £20 a month is an e-health service with an easy-to-use, consumer-focused interface. It allows subscriber to connect with NHS doctor within six minutes via online app who can guide as general practitioner can do, except a physical examination. They are allowed to issue prescriptions, referrals and sick notes, and even provide feedback to your family GP's records. The most important security-wise, the company says that the video link is encrypted and is trashed after call.

Other examples include HealthTap that costs for \$99 per month. It is a technology company that delivers a suite of connected health apps. Their stated mission is to "Help billions live a healthier, happier, longer life". It provides no-wait/instant physician models certainly designed to improve customer experience for patients.

The Ecosystem model:

The Ecosystem model of Google and Apple can be applied for pharma, where it can be used for “Beyond the pill concept”. As, drug is simply one part of pharma ecosystem, like search is one part of Google's ecosystem but, we pay for other elements also. Similarly Apple's products are link together flawlessly, so Apple laptop or iPhone user probably will go for Apple Watch instead of a Fitbit. While disease management program, lifestyle disease management program have been part of pharma's armamentarium since years, they have not been value making streams. With IT enabled devices like wearables, ingestibles and implantables they offer huge opportunities for pharma companies to manage health of their customers and also to know how well their medicines are functioning. The day is not far whereby drugs will be accompanied by mobile app and devices to track its outcome.

Focusing on data and customer needs ecosystem model can be applied in getting better patient engagement by optioning to multi-channel and omni-channel communication strategies, combining sensors with patient data that will predict future illness; etc. Pharma must keep up with innovations and utilize the latest tools, techniques and technology to evolve the business model to make themselves successful value creator.

Status of Digital Maturity in industry:

Digital transformation is all across world and it is changing the way businesses are managed and healthcare is no exception. In USA, almost 70 % of population use online channel. Almost all top pharma companies have a digital officer and other designations related to digital roles at a senior-management level. With this initiation, the digital performance across industries is taking shape.

Pharma as well as healthcare, either have to adapt and evolve with the new wave of change in current era and build an organization with digital systems and processes or either compete with competitors by means of sensible but out of box marketing strategies that will deeply motivate the consumer.

While referring to various digital maturity articles, I came across McKinsey article in which it has mentioned its case diagnosis study of company's digital maturity. The assessment was about evaluating the performance of digital leaders across various industries considering four dimensions like strategy, capabilities, organization, and culture. It was observed that only 10% of pharma companies take strategic decisions on quantified and granular data of digitization across competitive players as compared to 22% across all industries. If we rank pharma companies high-mid-low as per their digital capabilities, the one which are high ranked are having well planned digital strategy and are now struggling to scale up initiatives and capabilities. Those with mid rank are having strategy but are uncertain about its execution. And those with low ranking are yet to even develop a robust digital strategy.

It is estimated that the organizations fail to realize the application of digital strategy because of analytical gap. Thus, many organizations will focus on building capabilities and deliver new services or insights to stand firmly in this disruptive era. Pharma organizations lack the understanding of tracking patient journey to map digital touchpoints and align them with strategy. Considering digital engagement at core

and then executing strategy is way forward. There is no doubt once the digital initiatives are placed in order to connect patient and physician, it will improve and will initiate organizational engagement to interact with patient and physicians to design better customized solutions. In this competing world, every pharma company irrespective of aspiration needs to relook at how patients and physicians prefer to learn and interact.

Depending on the extent to which organization needs to implement digitization, a lean working management committee to drive those priorities should be established. Tomorrow, winners will be defined by their agility and adaptability, capability to tackle hastles and move ahead as quick as possible in comparison with their competitor.

Case study:

At Sandoz, the organization is aiming for two main digital applications. Starting with digital transformation and followed by digital enablement, they are now looking at usage of existing technologies for incremental improvements in areas such as e-commerce. In a recently-announced collaboration with Pear Therapeutics, Sandoz will commercialize two prescription software applications, in the field of digital therapeutics. In their second project, Sandoz is developing a service offering for key stakeholders by means of digitization. And in third project they are planning to use AI to improve commercial efficiency in key markets.

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About the Author:

Ms. Titiksha Shinde, is a senior Research Associate in Interlink Consultancy and has worked on projects like Business Due Diligence and Go-to-Market launch (Pharma). She has assisted in writing more than 12 pharma articles published in reputed magazines like Express Pharma, Asian Hospital & Healthcare management Magazine, Pharmabiz. Also, she has individually published articles on "Briefing pharmaceutical industry and its dimensions" in In-house published magazine "Interlink Insight". Being a post graduate in pharmaceutical analysis she has presented her major thesis in "Method Development and validation in Antimicrobial Herb".





Sales Management- Building High Performance Sales Team



*The challenges faced by the pharmaceutical industry in managing highly dynamic regulatory and economic condition has impacted the business performance of many organizations. Further such tough business environment has prompted organizations to look for high performance sales teams to sustain business growth. The process for building such teams calls for developing an approach of Assess-Train-re-assess. - By **Dr. S. Syamal Ram Kishore**.*



The Pharmaceutical industry in the last decade has witnessed a spate of changes which have led to the evolution of the pharmaceutical industry into a resilient and progressive industry. The regulatory, infrastructural and Information technology changes have drastically impacted the pharmaceutical business in India. One of the obvious areas where the changes have impacted is pharmaceutical formulations selling which in India is one of the dominant activities with a high level of visibility.

The channel dynamics in the pharmaceutical sales channels has also been impacted with the economic and regulatory changes witnessed by the industry. The business policies of the industry have evolved over the years to meet the changing business environment in the industry. On this backdrop it is interesting to observe the sales management styles and their adaptation to measure up to the organizational requirements.

After a very long process of denial by the Indian Pharmaceutical Industry of the branded generics structure of our thriving formulations market, it has now sunk into most of us that we are poised to see a branded generics market competing with non-branded generics. The famous government initiatives like “Janaushadi” and many more are in line with the fact that we are now an evolved generics market.

The dominance of Indian pharmaceutical formulations manufacturers in the last decade is evident with some new companies gaining huge market shares. Further the mergers have led to the multinational and large manufacturers consolidate their market strengths and portfolios. This has also resulted in companies having large field forces with complex field structures.

The Indian pharmaceutical has started feeling the burden to deliver due to the backward flow of economic and business pressures in the export markets. This has impacted all the medium and large companies in terms of bottom lines. The result is renewed pressure on the domestic market, which has evolved into a core business segment.

Such focus by industry on a market triggers severe competition and results in the challenges of driving sales quarter on quarter. This now brings us to the point of introspecting how has all this been taken up by the sales management function and the most critical ingredient –The Sales Team. There could be very serious implications if the organizational priorities are not translated into objectives which are comprehensible by the Sales Teams. The question that corporates have to probably debate is have we invested enough on our sales teams to face this evolved organization need to face the new challenges in the old domestic market. The jargon of “High Performance Sales Team” seems to be a great thought but can never translate into a reality unless the investments on these “Sales Teams” is substantial to drive the “Sales Engine” of the company. The eyewash sales effectiveness management programs cannot be solutions to meet the emerging challenges faced by the sales teams.

Traditional sales approaches have always been followed by the pharmaceutical industry with an inherent sluggishness to adopt any new approach from the other industries like the FMCG. There could have been genuine problems due to regulatory restrictions on pharmaceutical product promotion, but taking inspiration from the newer approaches should not have been avoided.

The High-Performance Sales team

This brings us to the question of what are the ingredients for a “High Performance Sales Team”. The answer cannot be a list of few descriptions, since the definition of a high performance sales team is quite subjective. For some it is just sales team which continuously meets the objectives and tries to exceed them. For others it is a team which sets its own objectives in line with the organizational objectives. While we can debate on the right definition, it is evident that Sales Teams which deliver and are able to repeat it again and again are the most valuable assets for the organization.

The challenge is can we build such teams and retain them across a reasonable period of time for delivering value for the organization. This indeed is the question, which drives us to think of the current sales structures and the techniques used to train and deploy sales teams. These have to evolve as the markets challenges and customer profiles are continuously evolving. The ingredients for building such sales management methodology needs to take up continuous measurement of the sales personnel and invest on bringing them to their best performance potential.

Assess-Train-Reassess

The above cycle of assessment –Training –reassessment is one of the classical approaches which the other industries have adopted and successfully implemented in managing the sales forces. This can probably take us close to defining our “High Performance Sales Team” since we are assessing the sales team against organizational objectives and moving away from the myopic parameters of just sales effectiveness alone.

About the Author:

Dr. S. Syamal Ram Kishore, is Founder-RIPEN –An organization focused on pharmaceutical product and sales management. He is currently working as Director-Business Development at Hexawel Healthcare. He has been a Senior consultant in Productivity and Sales force navigation to Interlink for several years.



Can Brands Be Developed Now in India?



Brands can certainly be developed in India today. India is a leader in the world Pharma market. Although it's a Branded Generic market, some iconic brands have been developed over the years. Of late this trend has slowed down and product life cycles have become shorter. External factors are being cited as the reason for this. But corporates need to adopt a robust product differentiation approach, maintain consistency of brand promise and performance and focus on brand building to establish mega brands. – By Mr. Supriyo Lahiry.



The Backdrop:

This article is being written and will be read in April 2019 when the Indian Pharmaceutical Industry is ranked as the 4th largest in the world by volume and anything between 13th and 10th by value. Today our domestic pharmaceutical market is worth approximately 114,000 K crores. It is amazing to think that just about 100 years back, the above figures were near zero! Compared to this, Indian textile industry was already a powerhouse at that time. Even a new world industry like steel was well up and running in India. But it was only in 1901 that Acharya P.C.Ray set up the first Indian Pharmaceutical company, Bengal Chemical and Pharmaceutical Works. The Indian Pharma industry has come a long way since then. It was not a mean feat to compete with countries who were decades ahead in technology, research, infrastructure and trained manpower and assume such a leading position in the world stage. This was possible through a combination of favorable government policies and the enterprise of the industry itself.

Current scenario:

In the 1960's when the Indian government abolished product patent and introduced process patent, it opened the highway for Indian companies to produce and launch internationally patented molecules, albeit manufactured by a slightly altered process. As a result, scores of companies launched the same molecule under their own brand names giving rise to a unique market type in India which is now called the 'Branded Generic' market! No doubt, a true oxymoronic term. The vast country, its growing population and the huge demand for modern medicine were conducive to this growth. Does it mean that the domestic Pharma industry failed to build successful and enduring brands?

Happily, no. One look at the top 300 brands of the Indian pharma market today would make it clear that in the past decades many iconic brands have been established. The top 300 brands constitute Rs.35384 Cr out of the total market size of Rs.113686 Cr. That is 31%! Almost 70% of the market is comprised of smaller 'Me-too' brands. And out of the top 300 brands, 246 are more than a decade old. They have not only become household names but are synonymous with their categories and are still holding their fort and growing at a healthy pace. In this context, Dexorange, LIV 52, PAN, PAN-D, Becosules, Calpol, O2 are few such brands that come immediately to mind. There are many more.

The Question:

Then is it right to raise the question, "Can Brands be developed in India now"?

Yes, it is. A keen observer of the industry would have noticed that in the last decade or so emergence of such iconic brands has become fewer. While the number of launches has gone up, the average life cycle of the brands seems to have become shorter. The factors responsible are both external and internal.

External factors:

- a) The central and state governments are actively pushing 'generic-generic' products through different programs e.g., the Janaushadhalayas. The Ayushman Bharat scheme launched by the central government is also gearing up to supply generic medicines.
- b) The advent of on-line pharmacies is helping in this push towards commoditization

of pharmaceutical products. Whenever someone searches for a brand on-line, he is rewarded with at least five alternatives with the same composition along with the most economical option.

- c) The recent expansion of the price control regime under NLEM has not helped matters by shrinking the bottom lines.

Internal factors: However, we think that the way the corporations are operating is primarily responsible for this.

- a) Most companies seem to have adopted an only sales number oriented 'Grab whatever is going' kind of approach. With this approach one does not consider factors like, the right therapy or segment. The objective is just grabbing a slice of the pie while it lasts. That is why we regularly see companies having no equity in the chronic therapy launching molecules like Telmisartan or jumping onto the bandwagon of Itraconazole regardless of whether they have any truck with dermatology or not. Or even the same company launching the same molecule under two or three different brand names!
- b) In the absence of long-term vision for the brands launched, the life cycle is shortened further.
- c) Lack of innovative, differentiation-oriented approach essential for Brand building.

The Answer:

To my mind, answer to the central question of this article is a resounding YES. Yes, it is very much possible to build brands in the Indian domestic Pharma market today. There is no doubt that compared to other fields, building brands out of pharmaceutical products is a different ball game altogether, because of the inherent nature of the products. Basically, a pharmaceutical product is a chemical entity which is structurally and functionally same regardless of who or under what name it is launched. In addition, pharma industry is closely regulated in every aspect including the way its products are marketed and advertised. This adds to the challenges of brand building.

However, room for innovation and differentiation is always there. Consider the few examples of product differentiation mentioned below and it will elucidate this point better.

Dynapar water-based injections:

Novartis was the world leader in Diclofenac. A small company called Troika brought out water-based diclofenac injection, DYNAPAR and became the leader in Diclofenac injection market.

Zincovit:

Multivitamin market was ruled by large companies. Again, a smaller company called Apex launched Zincovit, the 1st multivitamin plus zinc. Today it is a brand worth Rs.200 Cr!

Dolo 650:

Paracetamol had become a commodity. In the branded paracetamol market Calpol was a giant worth more than Rs.200 Cr. Micro labs found that 650mg strength of paracetamol could be a separate entity. Today Dolo 650 is a Rs.120 Cr brand growing at healthy rate.

Surprised? Don't be. Many such examples abound in the so called "Me-too" crowded Indian pharma space.

The Way Forward:

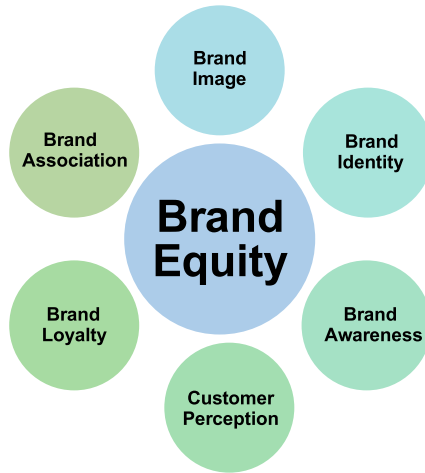


Fig. 1: Process of transforming data to wisdom through AI

As shown above, product differentiation is important. However, a product and a brand are not the same. A brand draws its value from the perception about it, the expectations from it and most importantly the emotions attached to it. The attached diagram will help understand all the factors that go into building the equity of a brand.

A product could be instantly meaningful as long it serves some useful purpose for the consumer. For example, when the search engine 'Google' was launched it was not a brand. It garnered a lot of users and they found the user experience is better than the services existing then. It became a brand much later.

Brands become meaningful over time. They are built over four major attributes.

- 1 Consistency of brand promise and brand performance
- 2 Persistence on well researched brand positioning and communication
- 3 Restraint
- 4 Focus

Fig. 2: 4 Attributes of Brand building

The first point is self explanatory. A brand must stand for something consistently and perform consistently over the years.

Product differentiation is not enough. A unique positioning must be worked out and communicated consistently. The basic communication of O2, the Rs.100 Cr. plus antidiarrheal brand has not changed in the last 18 years.

It is important to exhibit restraint. Restraint in diluting the existing brand equity. This happens by falling prey to the temptation of using the established brand name in too many line extensions especially in categories that are unrelated. And restraint in changing the brand promise trying to adjust to every passing fad.

In Brand building there must be a razor-sharp focus sacrificing many other things along the way. An example of sharp focus is USV's launching a dedicated division for promoting their mega brand Glycomet GP. The brand is now ranked as number two in the entire Indian pharma market, valued at a whopping Rs.476 Cr!

In conclusion let me reiterate that, Brands can certainly be developed in the Indian Healthcare/Wellness space. I used the word Healthcare/Wellness instead of pharmaceuticals because it's time that Indian pharma companies reinvent themselves as healthcare companies. That will open the opportunities of entering and developing strong brands in other patient-centric areas like, nutraceuticals, OTC healthcare/wellness products etc.

To do this corporates need to invest time, effort and money in developing well differentiated products/services, position these brands accurately, and construct their corporate objectives and strategies around such brands.

About the Author:

Mr. Supriyo Lahiry, the founder of Brandplant, a marketing consultancy firm is a Pharma Sales and Marketing professional with almost four decades of experience. His last assignment was that of Sr. Vice President, Medley Pharmaceuticals in charge of domestic operations. In the Indian Pharmaceutical space, he has given rise to new market worth more than Rs. 1200 Cr through his innovative launches of iconic brands like O2, Dompan and Ostium K2. As a mentorship initiative he runs a weekly blog on LinkedIn with an average viewership of 40000, under the name Brandplant.





Role of Nutraceuticals in Health Performance



We all are well versed with the quote “Exercise is king, nutrition is Queen, put them together and you’ve got a kingdom”. This quote very aptly suggests when good diet combined with physical activity can help us to reach and maintain overall health. But is it really possible today to practice the various steps required to feed our body with the required nutrition? Even if anyone does, growing amount of pesticides in fresh vegetables and fruits doesn’t make the diet poor in nutrition. Hence can Nutraceuticals be considered as power to nutrition & health? .

- By Ms. Shruti Patil.



In this fast-paced world, we are constantly moving ahead with our daily challenges and in order to match up with the pace, we often forget to take a moment to look at our health. Today everyone wants to feel good, look good, have lots of energy at workplace and have everything inside working at its best. Hence ultimately the aim is to protect oneself against possible disease and future illness!

But our consumption of junk food, lack of proper exercises and rest adds up the toll in our body. Various health organizations point out in their studies that this contributes to around 5.87 million (60%) of deaths in India every year because of lifestyle disorders like diabetes, cholesterol, obesity and the list goes on.

So, to keep these health-related conditions at bay there is a growing fitness revolution in India. The number of fitness clubs, gyms and personal trainers is rapidly increasing and so is number of people taking part in endurance activities. This is where Nutraceuticals come in!

Performance nutraceuticals:

The performance nutrition which was previously limited to athletes and body builders now has two distinct sub-categories: those products designed for sportsmen or athletes and those marketed towards recreational and lifestyle users. And it is the latter category that is currently driving the rapid growth in Nutraceuticals market. In short, performance nutrition experiences demand in the mainstream along with sports fraternity.

As a result, there is a wide range of performance nutrition products available to support active lifestyles, improve immunity, anti-ageing, etc. Hence people are now consuming performance nutrition as a healthy snack, a refreshing beverage, and a quick and easy meal replacement as a step towards improved health.

Performance nutrition need:

Demographics of India show that it will become the youngest country by 2021, with 64% of its population in the working age group of 20-35. With this potential India is considered to be emerging superpower of the world. But the lifestyles of Indians have changed drastically with living speed, increasing work, industrial age, longer work schedules and various psychological pressures. Also the traditional Indian thali got replaced with the fast food which is lacking in nutrients. This has led to an increased incidence of diabetes, obesity, various cancers and vascular diseases.

Compass of nutraceuticals:

Hence to maintain work-life balance and to achieve better quality of life, people have started looking for health promoting foods, fortified foods and nutraceuticals. The graph below represents a relation between age and the possibility of health conditions. In the early life, the majority of nutrients are used for growth. As person starts to lead his/her life through different psychological, environmental and physical pressure, he/she suffers from different health related problems. Except few conditions, most of the lifestyle diseases and disorders can be managed through a good diet, dietary supplements and exercise.

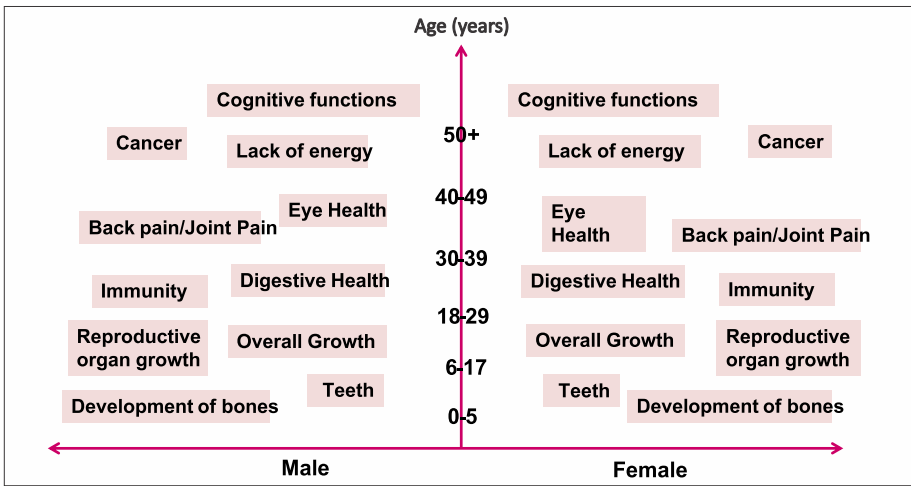


Fig. 1: Compass of Nutraceuticals

Source: © Dr. R. B. Smarta

Nutraceuticals useful for performance enhancement:

Science has confirmed that the food we eat can affect our health and longevity. The modern diet full of processed food usually lacks essential nutrients so eating that cannot complete nutritional requirement of body. Poor diet is considered to be one of the immune mediators that along with the progression of age, cause variable effects on the human immune system. Various factors that affect our immune system causing dysfunction are elaborately shown in following figure:

Poor Diet No Exercise Hectic Lifestyle	Progressive Immune Dysfunction				High Blood Pressure Heart Attack Diabetes Cancer Arthritis Asthma
	Stress	Acute Recurrent Infection	Allergies	Chronic Infections	
Negative Emotions	Stress headaches	Colds	Hay Fever	Candida	
Environmental Toxicity	Onset of Fatigue	Urinary Tract Infection	Food & Chemical Allergy	Viral & Bacterial Infection	Strokes
Age of Onset (Approx.)	15-25	10-35	25-45	35-45	45-60

Source: Nutraceuticals and their medicinal Importance

Fig.2: Progressive Immune Dysfunction

Functional foods and Nutraceuticals products represent bioactive phytochemicals that have health-promoting, disease-preventing or medicinal properties. Scientific studies, human intervention studies and clinical trials have also expanded to these areas and have explained efficacy and effectiveness of Nutraceuticals products. The majority of the Nutraceuticals does possess multiple therapeutic benefits and have been claimed to have physiological benefits to improve immunity or provide protection against various lifestyle related disorders.

Health segments & nutraceuticals:

1. Joint Health

With the aging demographic of 6-7% of total population, India is suffering from poor joint health. Many of those are afflicted with one of the many forms of arthritis. Even except elderly people, overambitious exercise, sports injuries and low calcium level in women are playing major role in poor joint health.

In Nutraceuticals, glucosamine and chondroitin are among one of the dominant players for joint health. Also, ingredients like omega-3 fatty acids, omega-6 fatty acids and Gamma-linolenic acid, as well as other antioxidants are gaining consumer acceptance. Clearly, nutraceutical remedies without side effects will enjoy a major opportunity in the joint-pain market.

2. Gut Health

The gut microbiota has been a topic of immense interest over the last few years, as its composition and diversity seems to be closely linked to health and disease. Microbiomes are considered to alleviate gastrointestinal disorders and immunity related diseases. Also, it is scientifically proven that there is microbiome influenced bidirectional gut-brain communication.

Prebiotic and probiotic products containing oligosaccharides, *L. acidophilus*, *L. bifidus*, and *L. casei*-are considered to be effective.

3. Hormonal Health

Whether for athletic performance, improved nutrient absorption, sexual virility or menopause hormone replenishment and enhancement will be in demand for next few years in India. Hormones are considered to be crucial not only for sexual, metabolic and physical performance, but often increase the absorption of key nutrients, such as calcium, as well.

There are some Nutraceuticals products which contain a synergistic combination of phytoandrogens and other herbs that promote optimal testosterone functions by maintaining the health of testosterone producing glands. Also, synergetic blend of isoflavones, present in Soyabean, and phytoestrogens from other herbs are designed to support healthy estrogen function.

4. Body Fat Health

Urban India's greatest comforts are the cause of a super-sized health problem, which is obesity. Easy access to high-calorie packaged food; sedentary lifestyles and a likeness for gadgets have resulted in almost 70% Indians in mega-cities such as Mumbai, Delhi, Bangalore or Chennai being overweight or obese.

Mostly wellness market is flooding with fat burning nutraceuticals products, yet new entrants like cutting-edge "fat burners," such as *Garcinia cambogia* and those containing chromium will play a significant role in coming years. Until new ingredients get accepted by consumer, the fat replacement market will be dominated by protein-based fat replacers.

5. Eye Health

Sight is one of the five senses and a crucial part of how most people perceive the world. Great value is attached to good eyesight and healthy eyes. Vision loss becomes more common when people age, but it is important for younger people not to lose sight of the fact that lifestyle choices now can impact their eyes in the future. Not surprisingly, healthy eyesight is one of the "gold standards" of good health. But, 86% of adults all over world are concerned about maintaining healthy eyesight, ranking above major fears like cancer and heart disease.

There are 4 major age-associated eye diseases namely cataract, diabetic retinopathy, glaucoma, and age-related macular degeneration. Besides this people are suffering from common eye related problems, like dry eyes, and Computer vision syndrome (CVS). The widespread use of computers, tablets and smartphones has caused the emergence of "computer vision syndrome" (CVS), a collection of symptoms related to the use of digital screens. CVS is widespread among populations using computer and other digital screens.

Currently, a research conducted in Indian schools estimated that 25.5% children (of all students) screened have abnormal vision. Similarly, IT professionals and geriatrics are worried of eye related problems.

It is well studied that the risk of cataract can be diminished by diets that are optimized by vitamin C, lutein/zeaxanthin, B vitamins, omega-3 fatty acids and multivitamins. Lutein and zeaxanthin are often considered together as eye supplementing Nutraceuticals as they are the two dietary carotenoids that are found in high concentrations in the eye. Recently, Nutraceuticals in different forms like beverages containing anthocyanins and other important vision sparing phytochemicals such as lutein and zeaxanthin have enjoyed great success in eye health market.

6. Emotional Health

Presently, India is home to over one billion citizens. The study conducted by World Health Organization (WHO) in 2015, shows that one in five Indians may suffer from depression in their lifetime that accounts to almost 200 million people. Not necessary the emotional discomforts is attached to disorders like schizophrenia & Alzheimer's disease only but a wide range of emotional discomforts like insomnia (trouble sleeping), tiredness or drowsy after waking up can also be the sign of an emotional illness.

Due to the stigma associated with mental illness, a lack of awareness and limited access to professional help, only 10-12% of these sufferers can get help in time. If the awareness is created Emotional illnesses can be tackled easily and health can be maintained with the proper psychological treatment and appropriate nutrition.

The brain health or emotional health needs to be taken care from the early stages of life, i.e., in fetus. Nutrients like long-chain polyunsaturated fatty acids (PUFAs) such as docosohexaenoic acid (DHA), folic acid, and choline are essential for proper fetal development, yet are often under-consumed. As human body constantly develops and grows from child-adulthood-old age, different Nutraceuticals play an important role to enhance mental performance, memory, concentration, focus, energy levels,

sleep, stress, depression and age-related cognitive deficits.

The Nutraceuticals like choline, functions as a precursor to the essential neurotransmitter acetylcholine. This neurotransmitter has a major impact on learning and memory and its deficiency leads to Alzheimer's disease. B-complex vitamins, Magnesium, DHA, 5-HTP and herbal extracts such as Ginkgo biloba, Ashwagandha and certain dietary supplements are also studied to be beneficial for advanced brain health function.

Lifespan health and use of nutraceuticals:

Life starts from student and span along retirement in India. Every situation in life needs specific performance and requires definite needs of nutrients and Nutraceuticals. Following metric will elaborate the needs:

Targeted Performer		Need of Nutraceuticals								
		DHA & EPA	Lutein	Fat Burners	Muscle Building Proteins	Glucosamin & Chondroitin	Probiotics & Prebiotics	Polyphenol	Dietary Fiber	Anti-Oxidant Vitamins
Students										
Working	Conceptual (IT, Management)									
	Labors									
Home Makers										
Sportsmen & Athletes										
Retired People										

Fig.3: Lifespan health and use of Nutraceuticals

Source: © Dr. R.B.Smarita

This metric shows the lifespan of individual performer that starts from student-earning-retirement where every person has to perform at his best. Hence to be productive everyone needs optimum nutrition which is specified in the chart above. If we look at person having sedentary lifestyle and working in IT firm, where physical activity is comparatively less than that of intellectual, there he requires more nutrients like DHA and lutein which will maintain health of his brain and eyes. On other hand he does not require much of nutraceuticals for muscle building as he is having a sedentary lifestyle. Although only few of Nutraceuticals are assigned as per the performance, this metric does not deny the fact that everyone needs all nutrients as per Recommended Dietary Allowance (RDA) . But at different stages of lifecycle, depending on extent of physical and mental work, nutrients intake should be taken care of.

Nutraceuticals is encompassing all promotive elements for human health. The uncovering of recent scientific facts and correlation with Nutraceuticals are growing and should gain enormous traction to promote health of any individual irrespective of any gender.

As consumer become more aware towards his health, Nutraceuticals must be backed with knowledge of evidence. When this will be brought in practice it may help to perceive individual health in different body segments and empowering them with promotive Nutraceuticals. Nutraceuticals are, if rightly used, useful from cognition to endurance to mobility keeping all senses in active conditions. So that

individual can enjoy fullness of life.

Knowing this enormous possibility of Nutraceuticals and as each individual wants to perform at his best every day, Nutraceuticals can provide all essential factors and saying as “performance nutrition for better health” makes it more practical to use it in day to day life.

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About the Author:

Ms. Shruti Patil is a Senior Research associate in Interlink Consultancy and has worked on projects and more than a dozen Nutraceutical articles published in reputed magazines and also on digital media.

Having an insight of different Nutraceutical ingredients, their usage in different dietary as well as nutritional sufficiency and hands on experience on Nutraceutical and business project, she would like to pursue her career in Nutraceuticals based on biologics, nutraceuticals and development of this industry as business.





Interlink's Recent Happenings...

Projects-

1. Doctor list preparation

Interlink team is working for a client to develop the potential Doctors list.

The process is initiated by explaining the importance of good Doctor list, its advantages and disadvantages. Clients team is inclusive of managers and accountable person from Sales, PMT, Admin, IT department to facilitate cooperation in data management. The pilot survey is carried out in one city, followed by PAN India survey by clients MRs to collect and collate the potential Doctors information. The exercise is just of 2 months followed by data management by clients team.

2. Diagnosis

Interlink is assisting a pharmaceutical company based at New Delhi to identify gaps or barriers existing for the growth of company. The diagnosis is a primary study, followed by enabling program that strengthens all functions of organization, specifically S&M, HR, Logistics, it looks forward to support the execution through enabling exercises.

New Initiatives-

3. Business Intelligence

Interlink is taking initiative to enable their clients with business intelligence dashboards. The dashboard tool will enable the top management to take smart decisions. The dashboard is an customized analyser that will run at back of the screen and will provide results instantly. The whole effort is to enable the top management to gain access to business variables on one screen and analyse the results in one shot.

4. Interlink Masterclass

Masterclass is an initiative taken up by Interlink to make a difference in the lives of professionals in the Nutraceutical and wellness industry. This platform will be talking on real time issues of the Nutraceutical Industry & the advice by experts will really help professionals gain a new insight & knowledge about the industry.

Nutraceutical regulations are almost changing every week and corporates need to find out their ways to comply with every amendment. Ist Interlink Masterclass is addressing a major issue of Claims and Labels. To find out ways to comply with changing regulations, corporate executives need an in-depth knowledge of regulatory framework and also a "to-do list". In fact, Ist Interlink Masterclass is a novel tool to provide a regulatory framework and manual to act on!

Knowledge Partnerships-

5. Perception Study

Nutraceutical industry is at growing stage in India and is about to reach almost 6 Bn USD by 2020. But to build brand with the sustainable growth, it is necessary to study how Indian consumer perceives Nutraceutical. Any decision making process is influenced by an individual's perception. One's perception may affect other people, group of people and their choices. Majority of the brands can be perceived on the attributes on what company says and how it says, but for Nutraceuticals it is of utmost importance to understand how consumer perceives.

Hence to map this perception, Interlink is conducting a survey amongst consumer to know their perception about Nutraceutical. This study will be a road map for those executives who are already in Nutraceutical Business and those who want to enter.

6. Nutrazest

18th March 2019, Khalsa College of Nutraceuticals

About Event: The department of Nutraceuticals of Khalsa College held annual food gathering, “**NUTRAZEST 2019**”.

Interlink's Presentation: Dr. R. B. Smarta was key note Speaker and Judge for the event.

He guided students to pursue their post-graduation in Nutraceuticals and enabled them to understand industry expectations as they are the future leaders of Nutraceutical marketplace.

7. Indian Dietetics Association (Mumbai Chapter)-HADSA Seminar Series 26th April 2019, SciTech (Mumbai)

About Event: Health Foods & Dietary Supplements Association (HADSA) held a Seminar on “**Need for Dietary Supplements & Nutraceuticals in Nutrition Practice**” in collaboration with IDA Mumbai Chapter. This seminar was held to make Nutritionists and Dieticians aware about the use of Nutraceuticals in their practice. This was the first seminar of this seminar series which was organised under the collaboration of IDA-HADSA.

Interlink's Contribution: Dr. Smarta was invited as one of the speakers and he presented on the “**Role of Dietary Supplements & Nutraceuticals in Healthcare**”. This presentataion was a roadmap to understand Nutraceuticals and its usage in practice.



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