

## Innovations in the Pharmaceutical Industry

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### ABSTRACT

The term Innovation generally refers to the creation or improvement of products, Technologies or Ideas. Innovation is distinguished from evolution in that Innovation generally signifies a substantial change or difference versus more incremental changes. The four stages of innovation – Imagine, Integrate, Isolate and Illuminate combined with the four perspectives of innovation – Incremental, Insightful, Inventive and Ingenious along the path to growth. The innovation process in Pharmaceutical Industry is highly 'Patient' focused and is supplemented by the 'Newness' mind set which originates from the 'Physicians' and pervades throughout the entire system including patient. Innovations in pharmaceutical research has enabled to reduce the period for development of parent molecule. The mismanagement and a search for solution which takes no account in biomedical Complexity / Clinical research are responsible for failing of innovative ideas for Pharmaceutical Industries. eg. The vaginal pessaries in Gynecology Suppositories for anti-arthritis are the example of innovation in Novel New Drug Delivery Systems.

**Keywords:** Pharmaceutical Industry, Pharmaceutical Management, Drug Delivery System.

### INTRODUCTION

If present industry overview is taken into consideration then the global pharmaceutical market in 2010 is projected to grow 4 - 6% exceeding \$ 825 billion. The global pharmaceutical market sales are expected to grow at a 4 - 7% compound annual growth rate (CAGR) through 2013. This industry growth is driven by stronger near-term growth in the US market and is based on the global macroeconomy, the changing combination of innovative and mature products apart from the rising influence of healthcare access and funding on market demand. Global pharmaceutical market value is expected to expand to \$975+ billion by 2013. Different regions of the world will influence the pharmaceutical industry trends in different ways.

Pharmaceutical industry is patient focused and doctor oriented industry. It is ever progressive, scientific, technology knowledge driven industry. Pharmaceutical

industry is responsible for present and future health of public. It is also responsible for development and formation of the drug with therapeutic value<sup>1</sup>.

### Present Scenerio of Pharmaceutical Industry

The long lasting success of sector is highly dependent on maintaining a steady rate of new product introduction and replacing old product.

For this success, they have to prove new drug much better than existing standards drugs in the terms of clinical, operating and development costs.

### Medical Field

Medical field have made breath taking advances which lead to the increasing fact of life expectancy in the population. It has enormously progress in the treatment of many health problems like infectious

disease, epidemics, cancers, cvs, hepatitis, child health problems etc.

### Research & Development

In the terms of finance advancement is becoming more expensive. Though rapid progress is seen pharmaceutical industry finance required for developing a new drug is terms of billion. Its just like one woman takes nine month to carry a baby in term does not mean you could reduce gestation to a single month if you were to involve nine women.

Despite of the high capital involved there is no guarantee for success for new drug development.

The cost and complexity of research have increased. Hence with every passing year, the pressure builds for pharma companies to go leaner across value chain to streamline drug discovery and introduce more efficient drug<sup>2</sup>.

### Innovation

The commercial success of pharmaceutical industry on innovation to a much greater extent than any other industry.

The term innovation generally refers to the creation or improvement of products, technologies or ideas. It is distinguished from enovation in that innovation generally signifies a substantial change or difference verses more increment changes.

Innovation is considered as dependent variables i. e. incremental innovation in form of drug enhancements and radical innovation in form of new drugs.

Innovation must be able to demonstrate added therapeutic benefit to patients when compared to therapeutic alternatives. i. e. Increase in relative efficacy.

Innovation process in pharmaceutical industry is highly patient focused and is supplemented by the "newness" mind set which originates from the physician and pervades through out the entire system including the "patient".

The increasing pressure to launch new drugs at reduced costs with profit gain has created business model that doesn't promote scientific innovation at sufficient

rates and risks the long term sustainability of the pharmaceutical industry. Innovation takes place in form of small increments, improvements to existing pharmaceuticals and as major scientific breakthroughs leading to new medicines or treatment regimens.

The current challenges to innovations in the pharmaceutical industry, the deteriorating environment in core pharmaceutical markets, the limitation of emerging markets. Strategies that promote discovery and development of innovative drugs. The industry initiative to counteract the decline in pharmaceutical innovation. Implications of regulatory pricing reimbursement and market access barriers to launching new drugs<sup>3-4</sup>.

### Innovation in Pharmaceutical Industry

Innovation in pharmaceutical research has enabled to reduce the period for development of parent molecule. The four stages of innovation – Imagine, Integrate, Isolate and Illuminate. Combined with four perspective of innovation – Incremental, insightful, Inventive and Ingenious along the path to growth.

#### 1. Innovations in therapeutic views

As many medicines are currently being developed and brought to market. It should be clear that only those products that bring real added therapeutic value and increased benefits to patients and which are truly cost effective in comparison to established pharmacotherapies should be adequately reimbursed. The development of new chemical entities and molecules result of innovative application of scientific approach from synthetic chemistry to scientific knowledge from field of microbiology, bacteriology, biochemistry and all related field.

It may be illustrated by the narrow and broad spectrum antibiotics replacing the use of sulpha drugs. Other example is Alzheimer disease. It is one of main reasons why many old people need care. Ageing is only known risk factor for this disease.

It is still incurable. A novel drug from Roche research, Switzerland could represent a major step forward in the treatment of this disease.

Recent studies have shown that FOV-2304, a non-peptide kinin B1R antagonist, abolished retinal vascular permeability, as well as leukostasis and leukocyte infiltration, hallmarks of diabetic retinopathy. Nowadays diabetic retinopathy is a main leading disease with blindness and visual impairment in adults. Innovative therapeutic approaches address the unmet need to prevent and treat diabetic retinopathy<sup>4-6</sup>.

## 2. Innovation in Biotechnology

Modern biotechnology is key to the technological success of 21<sup>st</sup> century. Its automation and information technology had given a new perspective for all areas of the life science and medicines.

Biopharmaceuticals have a breathful success especially in the treatment of the cancer. In future treatment selected will depend on the genetic pattern of the tumour.

A knowledge of genetic difference between patient can also aid the development of new drugs.

Eg. Docking and molecular modelling of target Penicillin binding protein -1A of *Haemophilus influenza* explaining vital role of penicillin protein in the biogenesis of cell wall and biosynthesis of peptidoglycan in bacteria. This is considered as novel target for pneumonia.

Other innovation in biotechnology is introduction of DNA repair mechanism as drug targets in prokaryotes of the great amount of pathogenic bacteria like mycobacterium species *Helicobacter* species<sup>2,7</sup>.

## 3. Innovation in Drug delivery system

The drug delivery system is necessary for effectiveness of drugs in a patient.

In treatment of disease and human disorder, discovery of drug is not enough but it is necessary to make availability of drug in proper delivery system.

In the last few decades, tablets, liquids, ointments, injections were only drug delivery system used by medical field. But with advance of scientific knowledge and technology gut route of administration reduces the effectiveness of above drug delivery system.

The newly introduced lymphatic drug targeting systems is used in treatment of pathological conditions like tumour infection, inflammation and also to detect tumour metastases.

This system has also useful for oral delivery of the newer generation peptides and a proteins that are currently examined for their therapeutic utility and it has also helped for drug administration which undergo extensive hepatic first pass metabolism<sup>4,8</sup>.

## 4. Innovation through Market Research

The identification medicinal need of population and physician had initiated innovation in marketing in pharmaceutical industry.

The multiple drug regimen is used for the diseases like T. B., leprosy etc initiated introduction to "Kit for the therapy".

The flavoured varieties of the bitter drugs, like various antacids like Gelusil, Digene are the marketing innovations.

The various combination of the drugs as well as modification of products in order to meet therapeutics requirements of the physicians and pharmacists are responsible for the innovations in the market.

Continuous changes in the requirement of pharmaceutical products in terms of colours, flavours preparations, packaging, labelling has leads to innovation in the pharmaceutical industries and market.

Introduction of different colour drugs formulations for either placebo effect or psychological behaviors pattern another example of innovation packaging in market.

The pharmaceutical market is evolving rapidly growing in complexity and there is less time to maximize a product's potential<sup>4</sup>.

## 5. Innovation in Research and Development

Pharmaceutical Industry is heavily dependence on Research and Development for new products and growth . However the basic research is time consuming and expensive process. It is only the large pharmaceutical industry who can allocate significant resources for research and development to introduce new products.

Economical Research and Development depends on the 3 strands in pharmaceutical industry i.e. Determinants of research expenditure, scale economics in research and development, Cost and returns from research and development.

Innovation in research and development lead quantitative relationship between various empirical data related to technological change in the industry.

In 1996 Mckelvery focused on genetic engineering in particular that of human growth hormone made with rDNA technique ( rDNAhGH) .

Anther innovation in research and development is "The commonality of metrics is rising. More companies are using metrics and defining them in the same way. In the next few years, penetration will likely get to the point that identifying benchmarking partners will become easier in R&D<sup>9-10</sup> .

## 6. Innovation in Pharmaceutical Management

Pharmaceutical management represent whole set of activities aimed to ensuring the timely availability and appropriate use of safe effective quality medicines and related products and services in any health care setting.

Identifying the management crises, innovation like documentation field like bids, cold chain, competative tenders, kits etc are introduced in the pharmaceutical field.

Innovation in mergers and acquisition contract marketing in licensing out licensing and brand building, selling, purchasing are the new innovations in resource mobilisation, optimization and management practices in pharmaceutical industries.

Innovations in the pharmaceutical management had set a better prospectus in Europe market. For Indian pharma giants like Ranbaxy, Wocharts, European market is becoming attractive<sup>11</sup>.

## 7. Innovation in the marketing process

Many pharmaceutical industry have deployed a plethora of strategies to target the various customer types recent business and customer trends are creating new challenges and opportunities for increaring profitability.

The success of pharmaceutical industry depends on competitiveners of supply chain.

Considering the marketing strategies the various business models like super core model, Acute therapy model were introduced that lead to significant growth in economical profit of pharmaceutical industry<sup>4</sup>.

## 8. Innovation in Industry Technology

Innovations in industry technology is not driven by any one kind of force but result of search activities of subject, selection of mechanism of institutional environment.

Competitive and technological changes in pharmaceutical industry from powerful new drug chemistries to innovative research and development partnership and marketing plans are reshaping the businesss strategies of many pharmaceutical and biotechnology companies.

According to new research from MIT program pharmaceutical industry ( POPI ), many companies today are searching for ways to increase productivity, decrease cost, and develop new treatment modalities that will enhance profitability<sup>12-13</sup>.

## CONCLUSION

As Pharmaceutical Industries are in rapidly developing states, new innovative plans are necessary to approach the final goal of development. But due to unsuccessful result of management and clinical research. Pharmaceutical industry is failing to innovate at a rate which is needed for health of the general public.

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