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INNOVATION IN HEALTH CARE SYSTEM: A CONCEPTUAL FRAMEWORK

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ABSTRACT

A lot of innovation has been seen in the healthcare industry aiming to enhance the quality of life, life expectancy, diagnostic and treatment facilities and also effectiveness, cost and efficiency of health care system. A major role has been contributed by the "Information Technology" in health care system. Despite the sudden increase in innovation, a lot of theoretical research on innovation of art and science in health care is limited. One of the factors of research that motivates a researcher to build the foundation of their studies is conceptual framework. It is important to start the paper with the meaning of healthcare and understanding the occurrence of innovation. A conceptual framework will then be developed which will explain how hypothetical variables will lead to innovation in health care. This paper will give direction to the researchers to deal with the questions related to healthcare innovation on the basis of proposed definition, dimensions, process and conceptual framework of Innovation in health care. A clarification on the concept of innovation in healthcare may make the things easy to understand for the policymakers of healthcare and practitioners to analyze, adopt & procure the services that actually identify,

encourage and prioritize the valuable innovations of healthcare. It is believed that the paper will play an important role in future advances in the research of innovations in health care.

1. INTRODUCTION

The word innovation means introducing new concepts, thinking, things, ideas or a new process of doing things. Innovation is necessary for every field and arena, be it education, public health, medical science, economics, production, or any other. Economist Schumpeter explained the importance of innovation in every single unit of business to the whole world's economy. He said innovation could be a small or big change in the process of production, in the framework of a company, developing a new product.

Innovation in health care is the main origin of improved quality of society, life and services. Advancement in medical field requires new and amended medicines, innovative, efficient and cost effective procedures.(Varkey, Horne and Bennet, 2006) If we study about the contribution of health care in improving the life quality and life expectancy over last 100 years we would find immense use of innovation in this as well medical and hygiene area. Number of example are there such as IVP (Inactivated Polio Vaccine) and OVP (Oral Polio Vaccine) is given to eliminate the risk of polio, Varicella vaccine is for escaping from chickenpox, MRI (Magnetic Resonance Imaging) can easily and accurately find the disease and affected area and further help in treatment also. Concept of stem cell collecting and securing it provides safety against many diseases. Process of IVF (In Vitro Fertilization) filled joy in many families. Cells causing tumour or cancer can be easily dedected.

Technological innovation provided a platform where results of diagnosis and advises can be easily shared within friction of minute, people can visit other doctors and get suggestion, advice for the same, or get themselves treated (Lansisalmi,et al., 2006) Information technology, Nano science, genomics, and biotechnology are altering dramatically the healthcare industry and breaking the old myths by providing easy and exact diagnoses and cures for different diseases, [Govindarajan, 2007].

Innovation is the main essence of healthcare and a catalyst which encourages better quality of health care which provides competitive gist of survival and productivity (Zaltman, et al., 1973). In the healthcare industry product innovation and process innovation are vital and can be used for making of goods and services and for series of activities (perri, 1993). Innovation in product provides shooting income while

innovation in any procedure provides potential to grow (Johne and Davies, 2000). Innovation is implementing a new method, introducing a new product, a marketing idea or a new organizational framework in an organization or a part of it. (UNESCO Institute for Statistics, 2005). UNESCO explains all the four innovations as follows:

- **Product Innovation**: Introducing new or slightly amended product or service and these improvements can be technological advancement, use of material, easy to use, and other functional qualities.
- **Process Innovation**: implementing a new or improved production and delivery procedure. It can be the use of different techniques, use of equipment and/or softwares.
- **Marketing Innovation**: implementing new marketing tools and procedures such as new pricing and promotion strategies, new product development, product design and its packaging.
- **Organizational Innovation:** implementing a new organizational framework, new way of working in the organization's practices, workplace organization.

Healthcare industry is more concerned for the innovation of product, process and the structure of the organization (varkey,et al.,2008). Product or service is something which generates income for example mercury thermometers were used to know body temperature and innovation of thermometer provides us digital thermometers, infrared thermometers, tympanic (ear) thermometers whereas innovation in process involves making or developing of it and to provide it. Efficient and cost effective procedure of making and delivering services or product not only adds value but gives satisfaction to the customers. Structural innovation is all about changes in business framework or creating new structure internally or externally to have new efficient blueprint or model of it. (varkey,et al.,2008)

"**Innovation in health care is pioneering a recently developed concepts, theory, product, process, which provides ameliorate cure, detection, pedagogy, prevention, avoidance, neutralization and objectives of continually improving quality, relentless safety, positive outcomes, and cost effectiveness.**"

There are some approaches to how information technology transfigures the healthcare sector (Gupta, 2008) such as:

- **E-Health and Telemedicine-** Consulting a doctor without being present there and getting prescription is very prevalent in US and countries but nowadays it is very commonly opted by Indians also (Gupta 2008). E-health

and Telemedicine are the services promoted by the ministry of health and family welfare (GOI).

- **Healthcare and Information System-** Amalgamation of healthcare and information system provide an easy to patients as well doctors, patients can connect with specialist doctors virtually and can share diagnosis reports for example with the help of tele-radiology X- ray can be shared to another location also. There are number of public and private platforms for telemedicine some of them are e- Sanjivani, Practo, Firstcry Parenting App.

- **Safe Drug Database-** A database of safe drugs for the whole world can enhance the faith and quality of living as people will be able to know about the medicines there compositions, side effects, reaction. This kind of database will make people know about the salts of medicines, if one is allergic to particular one can avoid the same. In India SUGAM (Central Drugs Standards Control Organisation) is an organization and gives an online platform of single window which asks stakeholders such as pharma companies, controllers, regulators and citizens for submission of an application, processing, grants, medical devices, cosmetics etc.

2. INNOVATION IN HEALTHCARE

As per the statistical report of (AIMED) Association of Indian Medical Device Industry there is surge in importing medical devices by 41% in FY 2021-2022, that is 63,200 crores to 44708 crores as compare to last financial year but healthcare industry is touching new heights of advancement with the support of central government as well as state government. There are some advanced technologies in healthcare sector of India-

- **Robotic Surgery** – It is also known as robot assisted surgery, this provides flexibility, control and precision in complex cases with less scars, blood loss and pain, and quick recovery.
- **AI (Artificial Intelligence) in Health Care**- AI just improved ,reshaped the methods of treatments, diagnosis and monitoring of patient
- **Medical 3D Printing or Additive Manufacturing** -This provide the right, comprehensive and accurate picture of anatomical and pathological shapes and structures.
- **Innovative Wound Care Devices** – Stem cell and bioengineered allogeneic cellular therapies, growth factors, xenograft cellular therapies are there, and

used when patient would not follow normal healing process (Frykberg RG,Banks J ,2015)

- **National Telemedicine Network (NTN)**- has been established to spread telemedicine services to all over India including remote areas as well as urban areas by enhancing healthcare facilities in states with the help of MC, DH, SDH, PHC, CHC.
- **National Organ and Tissue Transplant Organization (NOTTO)** – A web portal provides online registration for organ donation and encourages citizens to register themselves for it.

In the healthcare industry there is much efficient and comprehensive advancement but some are more prevalent in one area or one state and opted at a very slow pace in other locations. Spreading innovations in every area at the same pace is a great challenge in the healthcare industry [Berwick, 2003]. National Health Portal (NHP) has a mission to increase awareness about the health, cleanliness, services provided by the government and programs for betterment for health. This organization provides information in six languages so that it can facilitate everyone over India.

3. CONTRIBUTORS OF INNOVATION PROCESS OF HEALTHCARE

Healthcare industry is very vast and complex. It has so many opportunities and challenges when it comes to innovation. To implement any advancement it is vital to know about its components and contributors. Following are main stakeholders of the healthcare industry and their expectations on accepting advancement or innovations.

TABLE 1 CONTRIBUTORS OF INNOVATION PROCESS OF HEALTHCARE

CONTRIBUTORS IN PROCESS OF INNOVATION OF HEALTHCARE	THEIR NEEDS AND EXPECTATIONS
Patients ,Sufferer	Less waiting time, Proper communication of treatment and medicines, Proper Diagnosis
Doctors, Healthcare Providers	Advanced equipment and tools, delivering satisfactory services.
Firms related to healthcare industry	More revenue generation, effective and efficient outcomes

Hospitals, Clinics, Medical Centers, other Organisations	Improved in-house activities, less costing, more efficiency, Improved and quality results
Monitoring and Controlling Agencies	Procurement of patient interest and safety, less risk.

3.1 CONCEPTUAL FRAMEWORK OF HEALTHCARE SYSTEM

Number of studies says it takes time in altering the mind or changing the behaviour of doctors and their subordinates (Greco and Eisenberg, 1993), same goes with medical practices, and firms related to healthcare (Shortell, Bennett, and Byck, 1998; Shortell et al., 2001).Innovations in health care industry most of time controlled by laws and its tedious task to change particular process (Faulkner and Kent, 2001). Before implementing new innovations, these are properly examined in every step of its development so that only fruitful advancement can be opted and implemented (Faulkner and Kent, 2001). Stakeholders should be kept in mind for implementing and developing any innovative tool or process.

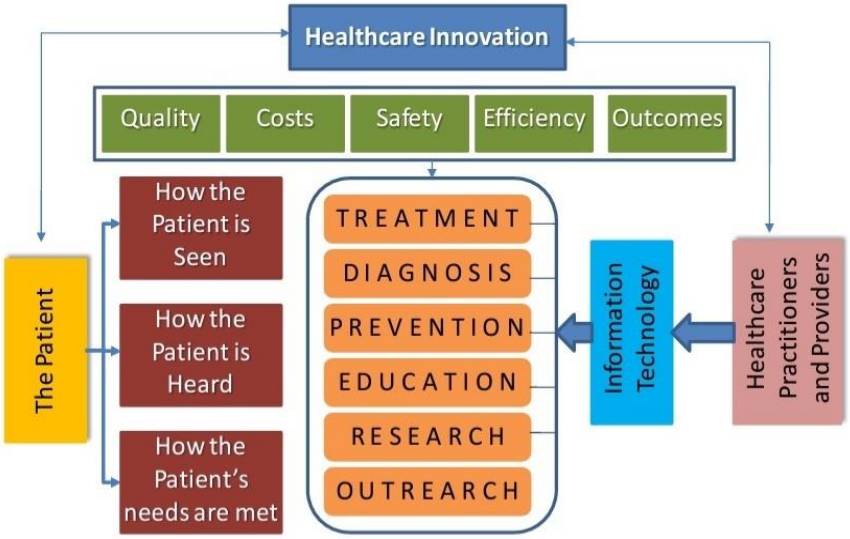

FIGURE 1 A CONCEPTUAL FRAMEWORK FOR INNOVATION IN HEALTHCAERE

As per above Figure 1, firms belonging to the healthcare industry have six impetus which are treatment, diagnosis, prevention, education, research and outreach. For performing these activities, Cost and quality along with safety, efficiency must be used properly to get desired results. The patient is a key element of the healthcare

industry and his needs, wants and experience is most valued for implanting any innovation. Doctors, Scientists, healthcare providers all thoroughly examine the innovations of information technology on the grounds of a patient's necessity and his condition before implementing it.

3.2 CONTRIBUTION OF RESEARCH AND DEVELOPMENT

In the healthcare industry, basic and applied research play an important role in development of new products and services as well as amending existing products and services with the help of Information Technology. Generalized goals are directed by basic research for example genetic research which is performed in a pharmaceutical laboratory. The results of basic research are used as primary information in applied research for the need of a particular industry and which row a path for developing of new or modified products, service or processes.(Britannica Concise Encyclopedia, 2006). Research & Development in the physical, life sciences, and engineering includes chemical science, nanotechnology, material science, pharmaceutical, biotechnology and many more whereas Research & Development in the humanities and social sciences deals with psychology, sociology, economics, and anthropology hence research and development in physical ,life sciences and engineering is quite different from research and development in humanities and social science. [Bureau of Labor and Statistics, 2008]. These differences are vital for advancement and for innovation in every field, may it be the healthcare industry or other [Omachonu and Einspruch, 2009].

4. THE PROCESS OF HEALTHCARE INNOVATION

There are so many studies and researches on the innovation process but the ratio of information on the innovation healthcare process is less than that. The process of innovation includes identification of problems, generation of ideas, evaluations and formation of ideas, development of product and service, use, commercialization, and finally the diffusion or implementation process. [Varkey et al., 2008].

In the innovation process in healthcare industry, it is difficult to decide what motivates to advancement or an innovation whether it is innovation motivates the needs or needs motivates the innovation, if we go with first one technology finds the problem and find the ways to solve it efficiently and in second one there is already a problem exist and technology tries to find out the optimum solutions. In both cases technology is essential for the innovation process. Following figure explains the process of the above conceptual framework.

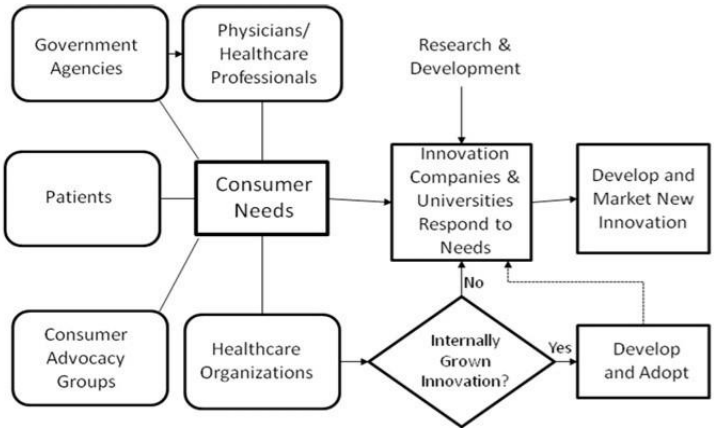

FIGURE 2 THE PROCESS OF HEALTHCARE INNOVATION

Most of the time the need for innovation is recognised by patients, the consumers of healthcare products or services or by the other contributors of the healthcare industry. Sometimes the need for advancement is recognised by government agencies and it starts the efforts for developing, implementing and checking its viability. Hence the very first step is to find need and when need is recognised, the next step comes to an existence that is how to cater that particular need, by internally or by making some sort of innovation. When advancement arises inside the firm or organisation, it is simply examined, altered, if needed, and implemented. And in the second case technological companies related to the healthcare industry develop, examine, and promote the new development or innovation to the healthcare industry. Healthcare innovation companies also give second thought to unsuccessful development of innovation of healthcare firms and try to rectify it to a new effective innovation and then promote it. When healthcare organizations(hospitals, nursing homes, or managed care companies) do innovation processes internally, these organisations don't have all equipment for research and development and have limited resources hence it has to rely on their staff, service provider, doctor's and patient's review. Sometimes healthcare firms collaborate with innovative healthcare companies because of scarcity of resources.

Following Figure 3, is the innovation process model for service organizations given by (Omachonu and Einspruch, 2009).which play a vital role in healthcare firms. The process of innovation in the service healthcare industry consists of three stages, where in the first stage a service is created for market needs.in next step this service is amended for wants and demand of the market (Beckwith, 1997).

As per Beckwith, Number of companies cease the process at stage two thinking they have attained the desired goal, hardly few companies continue the process to the third stage. Service innovation is based on what consumers like rather than on their inputs. A healthcare firm tries to know the real picture of service and technology by four quadrants (1,2,3,4) in a given diagram, where service and technology are two important factors. In quadrant 1 innovation is accompanied by new technology and new services, in second quadrant there is new technology and existing service, in third there is existing technology and existing technology whereas in quadrant four there is existing technology and new service.

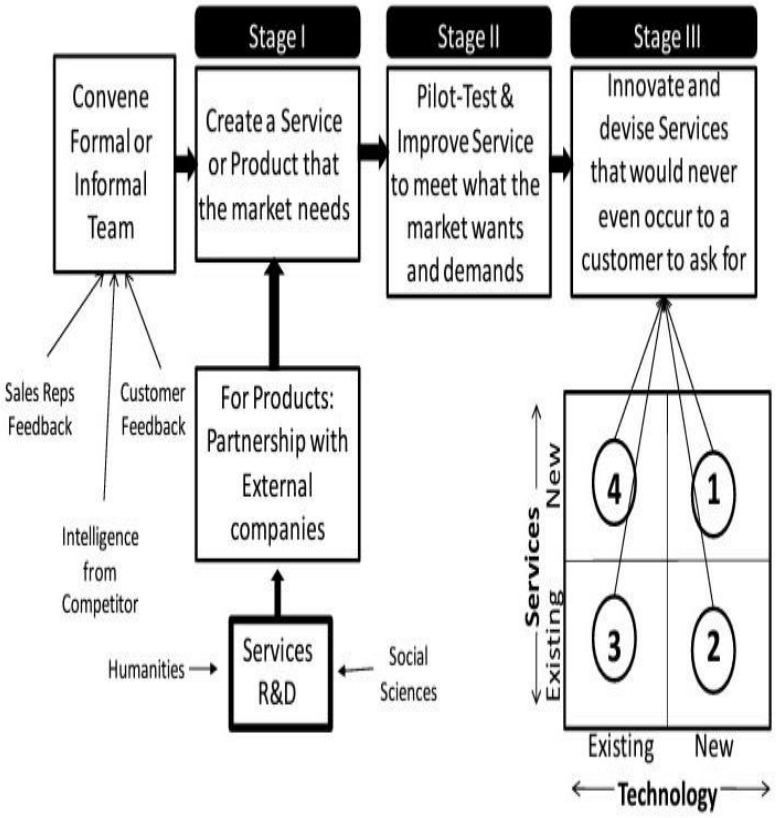

FIGURE 3 SERVICE ORGANIZATION INNOVATION MODEL

5. THE ASPECTS (DIMENSIONS) OF INNOVATION IN HEALTHCARE

Environmental aspect and operational aspect are two main elements of innovation in healthcare these elements drive or activate the initiation of innovation in healthcare firms.

As the figure given below has the environmental aspect, which consist of factors such as organizational culture, physician acceptance, partnerships and collaborations and regulatory acceptance.

The operational aspect which contains elements like efficiency, patient satisfaction, effectiveness, aging population, profitability, nursing shortage, patient safety.

FIGURE 4 ENVOREMENT AND OPERATIONAL DIMENSIONS OF HEALTHCARE INNOVATION

The two belts can be easily recognised there on the above diagram where the outer belt shows environmental aspects and the inner belt shows the operational aspect. Firms struggle to control the cost of healthcare spending, make improvements for staff's shortages, recognise the needs and problems of population, and try to cater to a well informed and aware consumer base (Elaine, 2002), innovation is a much needed thing which is required for quality living and improving health. [Varkey, Horne and Bennet, 2006]. An innovation can be said to be successful, when the environment is ready to adopt it (varkey.et al., 2008) and Berwick said that invention in healthcare is not as difficult as diffusion of it.

Following are some questions for discussions and further research. There can be number of questions some of them are-

- In a healthcare firm how stakeholders could be affected by innovation?

- What is the imputation of an innovation on research, diagnosis, treatment, prevention and education?
- In the healthcare industry all firms are not homogenous, what are procedures of implementing innovation in these organizations?
- What are the main motivators for healthcare advancements – the patients, safety, physicians, quality, costs, profitability or productivity?
- What is the role of information technology in the healthcare industry?
- What is the contribution of healthcare innovation in sustainability, controlling and usability?

6. CONCLUSIONS

Many topics of this paper could be the basis of new studies and investigations as well as for empirical research inquiries. Innovation in healthcare can be a formal subject or course of study that attracts versatile researchers. The conceptual framework, which is mounted above will provide a new idea of interaction amongst factors and stage give there. The aspects of innovation in health care can provide more insight knowledge for further study and to know the importance of dimensions of innovation. The paper can help policy makers to understand innovation of the healthcare industry and service healthcare as well as its process and components, which will be beneficial in decision making and implementing any innovation. The process of innovation presented above shows both thought process and practical process, both used by many healthcare firms.

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