

The review of the innovation of healthcare information technology to improve people's health condition in Cambodia

Abstract

Innovation can be defined as invention, adoption and diffusion. In healthcare, it may be a novel idea, product, service or care pathway that has clear benefits when compared to what is currently done. Successful innovations often possess two key qualities: they are both usable and desirable. Innovation has been a consistent feature of the private sector for a number of years. Studies in innovative practices in the public sector are increasing during the last three decades. The healthcare industry has experienced a proliferation of innovations aimed at enhancing life expectancy, quality of life, diagnostic and treatment options, as well as the efficiency and cost-effectiveness of the healthcare system. This issue aims to review on recent advances in various aspects of healthcare technology for healthcare development in Cambodia. We will go through some big private and public hospitals to find out its common strategies for better healthcare and treatment for the people.

Keywords: healthcare, innovation, information technology, Cambodia

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Introduction

Healthcare is overly expensive and incompetent of dealing with population explosion dynamics in every country all over the world. Healthcare improvements have caused in increasing life expectancy and accordingly resulting in more demands for healthcare services followed by a lack of medical specialists in some places around the globe with the highest desires. Along with the rapidly growth of information technology, combining with infrastructures and devices, healthcare management is increasingly taking place keep up through technology practices. The services of healthcare can be available to everyone at all time through the innovations of technologies. Patients, doctors and healthcare organizations can sharply access to healthcare and technology for healthcare information to make efficient decision-making for better services. Since the growing of healthcare, the society impact is delegated through productive practice of new aiming to improve healthcare delivery. The service of medical care requires behavioral change of both healthcare professionals and patients. The innovation of healthcare can be recognized as the creation of a new concepts, services, processes, or products in order to improve treatment quality, diagnosis, education, prevention and research, and with the long-term goals of upgrading quality, safety, outcomes, efficacy and costs. The innovation of healthcare pursues to be a dynamic measure in the research to balance cost containment and quality of healthcare. Innovation is considered to be a critical component of business productivity and competitive survival.¹ Innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.²

Healthcare situation in Cambodia

After Khmer rouge Regime, the entire healthcare system and major infrastructures were destroyed. The public healthcare was operating again during 1980s, and modernized healthcare services were accessible even though trained healthcare workers and some

medicines extended to be in short supply. The Government gives high priority to develop healthcare system with the international assistance, and then some major and continuous improvements in the health profile of populations have steadily rising. By 1983, six appropriate hospitals in Phnom Penh and nineteen dispensaries dispersed around the city provided growing numbers of healthcare services. The government introduced health sector reforms since the 1990s that emphasized on strengthening and extending the delivery of primary healthcare through the district health system. Physical infrastructure has been provided under the Health coverage plan, which determines the number, location and size of health facilities by group of population and geographical locations. Between 2004-2014 healthcare searching at public and private providers rise speedily for all classes of population across all socioeconomic layer, including elderly, disable people, and peoples with chronic disease. Most of the people have adapted health centers for primary healthcare, including consultation, normal delivery, preventive services etc. The prominently rise in healthcare searching at public and private entities for all groups of population, increasing from 84% in 2007 to 98% in 2013; relatively figures for disable population were 63% and 95%; and for population with chronic illness was 67% and 80%. Healthcare searching at formal entities raised from 50% in 2004 to 82.4% in 2013, while home care failed from 16% to 0.2% over the same time. People in rural areas practice private sector entities (drug store 38%, private clinics 35% and private hospitals 3%) and health centers to a lesser extent. Cambodia has noticed remarkable economic growth with an average annual rate of about 7.7% which has seen the country transformation from low-income to middle-income in 2016. Although most Cambodians are still economically vulnerable, with 70% of the population living on less than \$5.5 a day, the proportion of people living below the national poverty line has drastically reduced from 47.8% in 2007 to 13.5% in 2014.³ Gross domestic savings as a proportion of GDP has increased from 6.6% in 2000 to 18% in 2015.^{4,5}

Health outcomes have improved substantially, with life expectancy at birth rising from 58 years in 2000 to 68 in 2014, although healthy

life expectancy remains relatively low at 58.9 years⁶. Other health indicators, including maternal and infant mortality, have markedly improved. For example, maternal mortality has declined from 472 per 100 000 live births in 2005 to 161 per 100 000 in 2015.^{6,7} This has contributed to a steep decline in infant and under-5 mortality rates, dropping from 45 and 54 per 1000 live births in 2010 to 27 and 35 per 1000, respectively, in 2014.⁷ Beside these accomplishments, health outcomes in Cambodia still rank amid the poorest in the region. For example, the 2015 maternal mortality rate (161 per 100 000 live births), compares poorly with rates in neighboring Thailand (20 per 100 000 live births) and Vietnam (55 per 100 000 live births).⁶ Malnutrition remains a challenge with about 32% of children under 5 (about 500 000 children) stunted and 9% severely stunted.⁷ The country's rate of immunization against measles—around 81% of children aged 12–23 months in 2016—lags behind those of Myanmar (91%), Vietnam (99%) and Thailand (99%).⁸ On the other hand, alike to many low-income and middle-income countries, Cambodia faces a double burden of infectious and non-communicable diseases. While malaria, tuberculosis and HIV infections are still widespread, the growing burden of diabetes, hypertension and hypercholesterolemia in the adult population is putting strain on the health system.⁹

The digital transformation trends and challengers within healthcare

The future of healthcare is forming a new shape around the globe with advances digital healthcare technologies, such as artificial intelligence, VR/AR, 3D-printing, robotics or nanotechnology. We need to adapt and get familiar with the newest innovation aiming to control technologies. Digital technology will develop unsustainable healthcare systems into sustainable ones, equalize the connection between medical doctors and patients, deliver cheaper, faster and more effective solutions for diseases—technologies will simply lead to healthier individuals living in healthier groups. As the advancement in technology, Cambodia has already made big improvements; it still has to take full advantage of the potential offered by such advancements as artificial intelligence, 4G, and cloud technology to improve its healthcare sector. High costs and a lack of skilled professionals are the main challenges as Cambodia seeks the digital transformation of its healthcare sector. Ministry of Health of Cambodia recognizes the importance of using digital technology to improve its healthcare sector and is making headway in the digital transformation effort. The use of information technology has grown in the public health sector in Cambodia over the last decade. Healthcare technologies, including IT, is not only a matter of technology solution, but also a matter of how to use technology to transform the healthcare system to provide safe, quality, and effective healthcare service to people in equitable fashion. But Cambodia still has a long way before it can catch up with its more developed neighbors due to the very high cost of developing and maintaining digital solutions for the sector. Cambodia lacks the highly-skilled people (software developers, IT experts) needed to develop, use, and maintain such advanced systems.

Healthcare sector to be transformed in Cambodia

There are diversities of public health technical research documents wrote by the Pan-American Health Organization that recognized a strong connection among the growth of economics and healthcare in the region. Recently, the policy of health financing in Cambodia has concentrated on cutting the limitations to access healthcare services, specifically between the most vulnerable Cambodians. The government of Cambodia has mentioned the requirements for sustained and expanded participation of the group of countries in

healthcare. Cambodia is still one step behind compared to the most of neighboring countries and as in reality the low conditions of hospitals and the limited number of licensed healthcare professionals push many people to go outside the country for better healthcare treatment. The customary methods of hospital operation are ineffective. People who travelling from the provinces need to bring their records when going for treatment. If they forget or lost their documents, they need to return to the province or go through repetition for testing. The other challenges include inferior healthcare services in public and private sectors. Effectiveness of health service delivery is stuck by resources limitation, specifically under-staffing, diagnostic capacity limitation, and insufficient of medicines supply and health commodities. Insufficiency of competent healthcare personnel within the healthcare system impacts healthcare service delivery effectiveness. Small investment in technology and ICT of medical care with capacity limitation at all levels to analyze, interpret and use data in clinical and administrative sites and reporting systems. Inappropriate healthcare-seeking behavior, specifically in rural or remote locations with delays in seeking care, self-medication. Though we are living in a technological era, it is ordinary to see handwriting information or looking for physical files for information in hospitals and private clinics across Cambodia. But with the latest technology of current world, this is far from efficient. The operation of web-based hospital management system helps the work flow in the hospitals process such as patient management, health records, and appointments to pharmacy. The system is enabling the process easier and payment transparency which showing on the invoice or devices.

Using technology to improve healthcare condition in Cambodia

The countries in ASEAN require development in healthcare services, infrastructures and medical supplies. The future advancement of technology improves the healthcare condition of people around the world, particularly those who have troubles to access healthcare services, increasing an emerging industry to foster reliable and trustable health information access. Health technology innovations provide information about health professionals, location of health centers, the communication and interaction of doctor and patient, vital data of most common diseases, and healthy foods idea, between others. The main purpose is to give trusted information of healthcare professionals and healthcare providers; expand the amount of people to access information by reaching to all location, especially rural areas. Cambodia has a growing and ageing population and most of the people are concentrating in rural areas, that bring the lacks in universal health coverage and can only access healthcare services have offered by some NGOs working in the country. The lack of trusted doctors, medicine and particularly pharmaceutical suppliers and the lack to access reliable information are the main factors for people that could afford private healthcare in Cambodia. Technology innovation industry can come up with to new opportunities and healthcare apps can develop telemedicine, produce trustable information and assist healthcare access gap between rural and urban areas in Cambodia. Technology truly conducts contributions to healthcare communication, education and the interaction between patient and doctor but it is insufficient to develop and build-up healthcare system infrastructures or expand material and human resources. Technology can contribute, but policies, governmental budgets and entire healthcare prevention education program are critical. For instance, the boundaries between commercial and private interests and public healthcare goals, an in-depth analysis of the problems of health systems, educate users to avoid misinterpretation of the information provided through their

smartphones that may put them in danger, or private data security and protection principles, just to name a few.^{10,11}

The needs for innovation in healthcare

The values of Innovation will be different between companies as there will be dissimilarities in their business scope and objectives.^{12,13} For example, it is an establishment of fact that forces innovation and improvement responsibilities in manufacturing situations are dissimilar to that in-service backgrounds.¹⁴ It indicated that factors for innovation should be at dissimilarity in entities and relevant sectors. Factors that manage innovation in the private sector have been discussed in the literature. Most of the companies have innovated in products and services development process.¹⁵ Deeper studies within this context have recognized Changing Customer Needs, Shortening Product Life Cycles, Increasing Global Competition, and Technology as the main innovation factors in the private sector.¹⁶⁻¹⁸ The factors of innovation in the private sector are described in Figure 1. The

factors for innovation shown in Figure 1 are very similar to the ones recognized in the public sector. For example, public service entities have observed the appearances of new technical managements that allow them to offer customized packages for people. This is allocated to the requirement of satisfy transforming peoples' demands and also completion the commitments made to different stakeholders.¹⁹ Long-term crucial problems, enhancing demand for municipal services, budgetary pressure as the slowdown and resolute issues with unrecognized solutions have been mentioned as the main reasons why public sector entities desire to innovate²⁰ Figure 2. Due to the familiarity appear among forces in charge of stimulating innovation in private and public sectors, researchers have been inspired to use the knowledge of main innovation factors in the private sector in researching the public sector innovation view.²¹ Similarly, it innovates by reflecting to different situations that include transforming patients' needs, technologies, nature of competition and operating environment.¹⁶ Independently, the healthcare sector needs a definite model for viewing its factors of innovation.

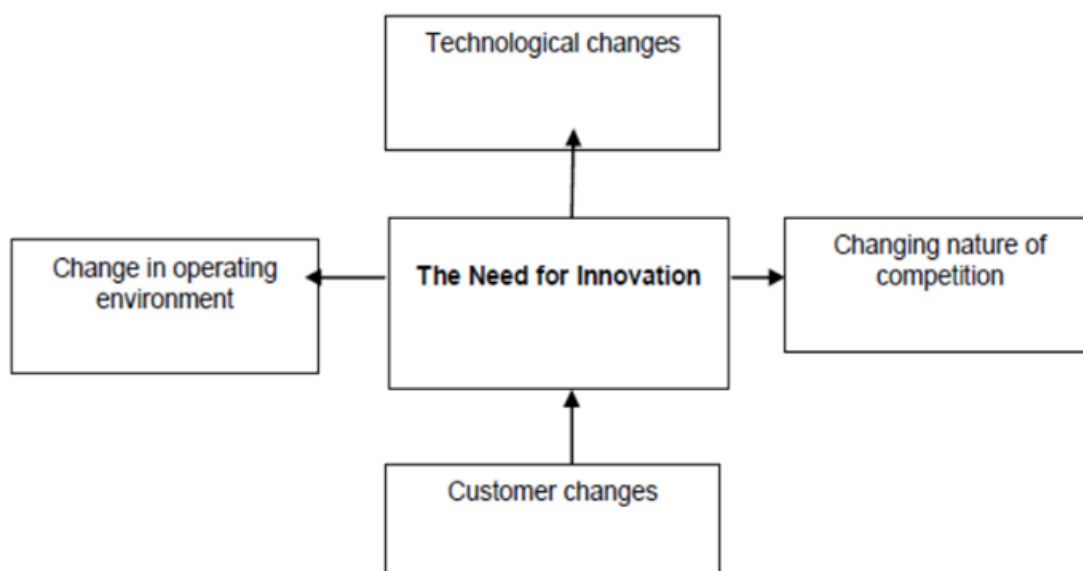


Figure 1 Force factors innovation in the private sectors.

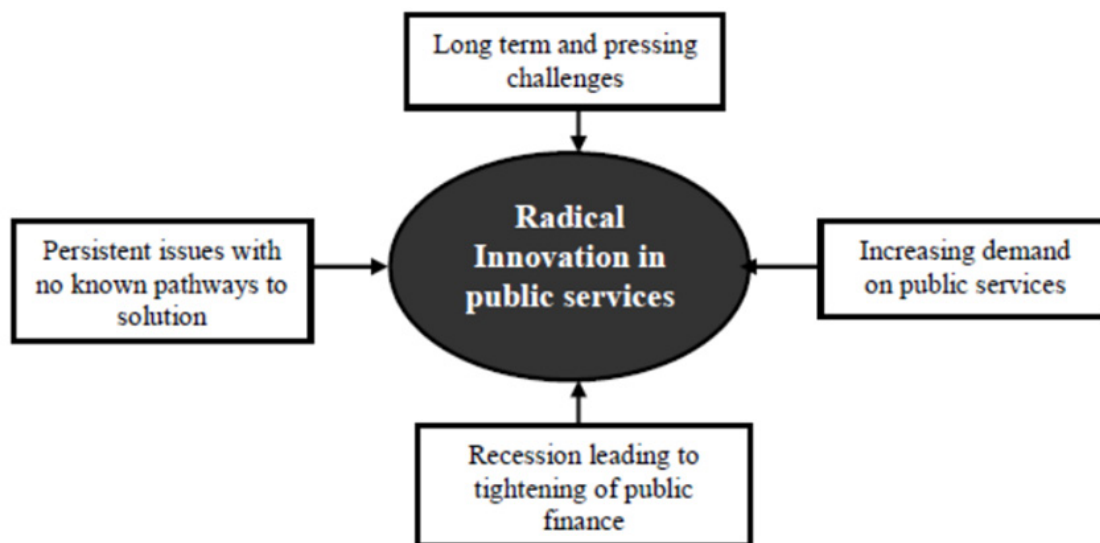


Figure 2 Forces driving innovation in the public sector.

This can be accomplished by creating on the understanding of main innovation factors showed in Figures 1 & 2. The flow of innovation is complicated and multi-dimensional involved industry in which it is being applied. Innovation in healthcare industry has its own distinctive challenges. Any effort to comprehend the flow of innovation in healthcare must start with an in-depth analysis of its challenges. There are five main stakeholders in the process of innovation, and each has its distinctive and intentional need needs, wants and expectations Table 1. Many researchers have mentioned that it is difficult to transform the behavior of clinicians,²² current medical practices, and healthcare organizations.^{23,24} The adoption of healthcare innovations is often regulated by laws, making changes more laborious.²⁵ In healthcare, the simple beginning points of the process of innovation may bring to death, disability, or permanent discomfort.²⁶ This, together with the clinicians' tendencies to save their individual autonomy and reputation, could promote a culture of blame and secrecy that inhibits organizational learning and the generation of innovations.²⁷ Additionally, new practices in the care of patients are traditionally scrutinized completely in their beginning development step so that dormant harmful innovations are not adopted.²⁵

Table 1 Stakeholders in the innovation process

Stakeholders	Needs,Wants & Expectations
Physicians and other care givers	Improved clinical outcomes, improved diagnosis and treatment
Patients	Improved patients 'experience, improved physiological well-being, reduced waiting time, reduce delay
Organizations	Enhanced efficiency of internal operations, cost containment, increased productivity and quality and outcomes improvement
Innovator companies	Profitability, improved outcomes
Regulatory agencies	Reduced risks and improved patient safety

Methodology

These articles is prepared in 2020, by review, analyses and evaluate relevant literature, articles, and collecting data from interviewee and source from the internet. The interviewee was selected from healthcare professionals and industry randomly. The composite showed here goes along with the scoping review protocol defined by Arksey et al.,²⁸ identifying the question; relevant literature; choosing the literature; charting the data; and collating, summarizing and reporting the results.

Results

Healthcare technologies shape up the providers of healthcare with instruments that are crucial for effective and efficient protection, diagnosis, cure and restoration and acquisition of health-related evolution purposes. Technologies in healthcare, particularly in healthcare devices, represent an economic as well as challenge in technical to the systems of healthcare and concerned about the waste of resources affecting from unsatisfied investments in technologies of healthcare, mainly devices of medical care, it doesn't meet high-priority requirement, irreconcilable with existing infrastructures, used incorrectly, or inefficiently functioning. Admitting the requirement to accommodate burgeoning costs by creating priorities in the variety and acquisition of technologies in healthcare, particularly in healthcare devices, on the foundation of their effect on the bundle of sickness, and to guarantee the effective use of resources by planning

correctly, evaluation, acquisition and management. Ministry of Health of Cambodia has opened the healthcare technology solution for the first time called the Smart Hospital, e-Health Yoeung program. Health Minister, Mr. Mam Bun Heng said, it will deliver benefits for people and healthcare professionals to manage the records of health and conduct appointments directly with doctors through mobile phones or other devices. The program will manage data of patients. Once patients travel to hospital, all information will be written in to the system, including type of medicine, relevant equipment and its utilization. The government has determined purposed to equip the technology of hospital management system to all hospitals over the country.²⁹

Due to Ms Limsan Pong, CEO of First Women tech Asia said, one among other factors to be discussed for the innovation is the principal of concentrating on the needs of user in healthcare industry when you are a healthcare technology entity. Anyway, deep technology entity aiming at healthcare also wants to search for a deeper research into technology, and expect that the research will establish a significant value of technology for future healthcare. MS. Limsan Pong added, people are able to use the technology through the app (e-Health Yoeung) digital card and QR code that identify the patient. Patients with the card will get their health records from the hospitals that they visited when they signed-in the card at hospital. All of the patient health records will directly be showing on their phone or other device once they logged-in. Both the card and the app have main functions to benefit patients and doctors. The app can permit patients to control their personal information, understanding healthcare tips every day and get important news from Ministry of Health and other relevant entities in healthcare industries.^{30,31} Preah Ang Duong Hospital director Dr. Lou Ly Kheang said, recently once patients travel to hospital, they must bring health documents that sometimes get lost and spend much time to wait for treatment. It is an important moment that the hospital determined to equip the app (e-Health Yeoung) as smart hospital solution and its smart card. Although we are a public hospital, but we are trying to improve ourselves and the technology in order to improve healthcare system in the country. People will know if they are sick and will come to the hospital due to the app function. It is not mean to force them to find the treatment and pay money, but they have to be cautious if they can get sickness.²⁹ The director of the Department of Planning and Health Information, Mr. Lo Veasnakiri said, the Kingdom recognizes the importance of using digital technology to improve its healthcare sector and is making headway in the digital transformation effort. The use of information technology has grown in the public health sector in Cambodia over the last decade. Healthcare technologies, including IT, is not only a matter of technology solution, but also a matter of how to use technology to transform the healthcare system to provide safe, quality, and effective healthcare service to people in equitable fashion. Cambodia still has a long way before it can catch up with its more developed neighbors. Cambodia lacks the highly-skilled people (software developers, IT experts) needed to develop, use, and maintain such advanced systems. High costs and a lack of skilled professionals are the main challenges as Cambodia seeks the digital transformation of its healthcare sector.³⁰

Reducing people travelling to clinics, hospital is the top priority thing and encouraging people to care for themselves and their families is something that technologies are already operating well. But when patients are encouraged, are the new technology helpful or unrealistically meet their expectations? Today, the internet is problematic, as there is no consistent way anyone can distinguish snake oil from sense, how patients can distinguish reasonable treatment from misguided hope—there will always be a lot of solutions

hunting for the patient's money.³² The solution to the technical problem includes providing recognized superior instruction; cultural solutions include improving education. Once patient has a knee injury at the age of 40, and it may not be the first time they face the confusing amount of variable instruction and social media on the internet. The management of their condition, somehow, will be much developed if they had been revealed to sensible strategies since young age. Technology has automatically transformed something's that used to be done by hand. Previously nurses to give injection very often, but today they can have more time to do other things instead just using technology. This can also reduce the cost of production and operation. The circle of creating new technology can ensure the act to reduce prices, increase market shares and profit margins, which in return allow the manufacturer to invest in more cunning production and distribution technologies. However, the important to be noticed is that these benefits do not ensure to custom or rare problems that cannot be mass production. The assumptions of mass production are already changing. For example, today's 3D printers can make objects of any shape; they are slightly efficient than standard mass production, but the costs of custom objects of certain sorts is decrease dramatically. Patients collect all kinds of information from X-rays after receiving blood test results. Replacing paper with computerized technology can generate accurate data and ensure patient care easier and more efficient. When computer technology collects data of patient illness, treatments and outcomes, so it will automatically retain the valuable information which be the effectiveness of those treatments, or maintain relationship between patients and doctors across the country.

Conclusion

Technology and digital provide new opportunities for better healthcare systems in Cambodia. I believe that technology will upgrade the health condition and if we go through the collaboration among people and technology, the surprising accomplishment will be resulted. Cambodia should remodel the healthcare system to a rapidly technology transforming the world because healthcare systems does not meet the standard. Cambodia need to emphasis the issues and building good education and healthcare systems. The need to put more investments are required and most necessary, Cambodia have to begin by equipping high quality education to next generation professional healthcare workforces. Moreover, professional improvement has to support the growing number of healthcare educators and professionals related to healthcare industries aiming to facilitate permanent improvement.

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Conflicts of interest

The author declares that there is no conflict of interest.

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