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E-Health Insurance Management System: Exploratory Research

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E-Health Insurance Management System: An Exploratory Research

Abstract

Being an intermediary, insurers are one of the key players of healthcare industry and the link has formed in between insurance and healthcare through health insurance. The convergence of information and communication technology along with cyber physical environment has already started to establish. As opposed to, the insurance industry has also apprehended and started transforming. The purpose of this review is concisely presenting the contemporary technological scenario of health insurance. As the implication of cyber physical environment seems to have started in the insurance industry, the methodology has been formulated under three strategies (e.g. evidence searching, filtering and describing) to sort out the most validated, authentic and updated sources regarding the health insurance technology. Even though, synthesizing with evolving technologies like big data, cloud computing, IoT and other digital trends depicted in this study has seen to be used in insurance industry; the substantial usage of these technology has been observed very few for insurance management systems. It is expected that the study will aid to illustrate a comprehensive view of today's technological scenario of health insurance and effort towards further related researches.

Keywords: Internet, Cloud Computing, Artificial Intelligence, Insurance, Health.

1. Introduction

The conjunction of Internet and information technologies is consistently developing the organizational and social functions in every aspect over the last few decades through a disruptive digital transformation. Consequently, the end user's impregnation is being mitigated through accelerating the digitization of business process and operational efficiency of the large number of companies (Li, Merenda and Venkatachalam, 2009). Through the revolution of industry 4.0 which is so called cyber physical system comprising of the integrated smart software systems including the internet address to enable the communication with environment and enable the next level of efficiency and flexibility for both organizing and controlling of the value-creation chain over the whole lifecycle of products and services (Bodrow, 2017).

The revolution of 4.0 is transforming both the production and service industry both into a new digitalized shape where machines are going to be ubiquitous. This transformation includes additive manufacturing, autonomous robots, adaptive CNC mills, connected cars, ubiquitous computing and the Internet of Things, data tools and analytics. This innovation also includes collaboration platforms, social networks, augmented reality, virtualization, cloud computing which have already converted the industry and end user's perception as well (Savastano et al., 2018). However, it has been observed that among all the industries, insurance has not been convergence of information and communication technologies simultaneously comparing to other industries. Insurance has been an industry reportedly found slow to adopt digital innovations, in part because it is so highly regulated; though, pervasive interest among customers has been observed to modernize their communications with their insurers (Noe, 2006). Recent research on the insurance industries by Boston Consulting Group regarding the digitalization in this completive age has revealed that the insurance industry is undergoing a rapid adoption of advanced technology and it is termed as "Insurance Today Face a host of digital to-dos". In this scenario the first and foremost initiatives of the insurance industry was to digitize the customer experience, build digital offerings and business models, and construct in-house digital capabilities (Ketterer et al., 2016). Nowadays, as the customers are technologically empowered, healthcare players are concerning to build new models and channels of having engaged. As a result, the insurance industry embarks on digital transformation journey and strives to digitalize their insurance processes to streamline customer service. The purpose is to tailor real-time

product and services for more personalized customer experience (Das and Datar, 2017). After the realization of today's consumer cognition, the industry is going through a rapid digitalization process. The key intention to conduct this study is to portray the actual contemporary scenario of health insurance in perspective of implementing evolving technologies.

2. Methodology

This study is an effort to come up with contemporary technological scenario and the transforming mode of health insurance industry through reviewing the secondary materials. It has been endeavored to accomplish the secondary study by means of investigating the research articles, editorial reports of some selected articles, authentic online articles, online magazines and report of some recognized corporations. Since the information was very limited in research journals (particularly health insurance technology), maximum information regarding contemporary technologies has been retrieved from online reports, articles and magazines with a view to get most updated trend of the market.

During review process, three strategies have been implied to confirm the validity, authenticity and compatibility of the secondary resources. The strategies have been illustrated in Table 1.

Table 1: Review strategy

Strategy 1	**Searching Evidences**
Strategy 2	**Filtering Evidences**
Strategy 3	**Describing the Evidences**

During search, some keywords have been applied, such as: "Digitalization, Digitization, Current Technological Scenario of insurance industry, Contemporary Technological Scenario of Health Insurance, Digital Technology in Health Insurance" and other synonymous word. In some cases, keywords have been applied in the journals' internal database, e.g. Springer link, IEEE, science-direct, PMC in pursuance of the journals advanced search process. And for other cases, google scholar has been used to retrieve the information. Three filters have been used to screen the validated and authentic papers. Filtering process has been illustrated in Table 2.

Table 2: Filtering process

Total Findings	77
Filter 1	**Abstract & Title**
Result	**25**
Filter 2	**Scopus, SJR,WB**
Result	**52**
Filter 3	**Full Text**
Final Selection	**27**

Because of limited relevant resources, the search for evidence was very complex. Moreover, to obtain the compatible and authentic resources, the evidences have been filtered three times. In terms of the journal article selection, all the evidences have been verified with Scopus, SJR and Web of Science under filter 2. Full texts have been prioritized by other evidences such as online reports and magazines depending on the most recent published date, the company and the website's reputation. Therefore, the total evidences resulted in 27. After the selection process, the evidences have been discussed and visualized.

3. Understanding Digital Health Insurance

Digitization refers to the networking of people and objects along with the convergence of the real and the virtual world that is enabled by information and communication technology (ICT). It is highly expected to be the most powerful driver of innovation over the next few decades and will act as the trigger of the next wave of innovation (Rivas, 2018). Digitalization is transforming the business process into cyber physical environment through the convergence of information and communication technologies. As are of the important key player, insurance industry is needed to be adopt digital health insurance processing as the health sector has already been digitalized. The contemporary scenario is, health sector identifies itself through implementing and leveraging information and communication technologies (ICTs) to deliver and scale healthcare to the masses (Kagermann, 2015). To be digitized, the insurance industry needs to adopt the digital application and internet technologies to influence several aspects of organizational activities and processes. It undertakes IT applications that enhance various inter and intra-firm activities including B2S (business to suppliers), B2E (business to employees), B2C (business to customers) and B2O (business to others) (Li, Merenda and Venkatachalam, 2009). To manage the digitized health insurance processing the industry have to have an enterprise-wide information

system based on the technological foundation of the Internet which means an extensive use of e-business tools and practices across the value chain, leading to a wide range of innovation opportunities (Johnston et al., 2007). This digitized business process will aid the insurance industry to adjust with the health industry by installing broad range of technologies and applications that is expected to enable more efficient automation, better decision making, stronger connectivity with customers and other external stakeholders, and more advanced data-driven innovations. These technologies, together with the business process redesign, make a new way of working possible, that can fundamentally transform a payor organization. For decades, productivity has improved far more slowly in the healthcare industry than in other sectors. Most payors are only beginning to adopt customer-centric thinking, prompted by the consumerization of health insurance. New, highly agile, digitally native firms are entering the market and could significantly disrupt existing business models (Kayyali et al., 2016). The components in Figure 1 adopted from digitalized health insurance provider (Lehmann and Sydow, 2015).

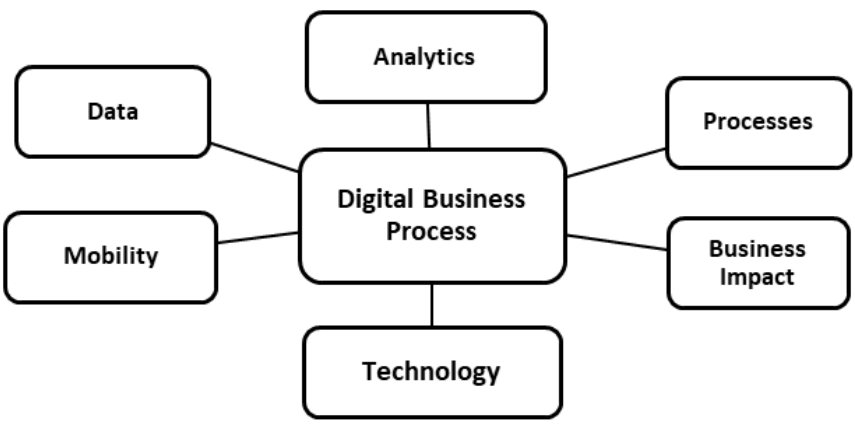

Figure 1: Digital business process

4. Contemporary scenario of Digital Health Insurance

The European Internet Foundation reported that the world will move to a knowledge society where real time is the dominant factor and the position of Europe with respect to the knowledge society will depend upon its transformational capacity—a move from mass collaboration to a "knowing society" (European Internet Foundation, 2014). On the other hand, the industry expert urges that digital transformation of the insurance industry is

delayed compared to the other industries (Muller et al., 2015). Even with a late start, the industry has already stared exploiting digital innovation and undergoing a rapid adoption strategy (Noe, 2006). Ruth Fisk, the global director of insurance at Hyland has uphold her view in an online magazine that the insurance industry has embraced technology and is investing heavily in insurance technology, which is now seen as disruptive and more as transformative force. Moreover, from that write up with other transforming areas of insurance like smart homes, driverless cars, automated farming; the intelligent health care are all set to revolutionize the insurance industry in near future (Fisk, 2017). It is quite clear that the insurance industry including health features is undergoing a transformational stage and very soon it will start rolling with the industry 4.0. A report generated by Financial Times illustrates that health is one area where the potential of monitoring technology is moving ahead fast. South African insurer Discovery, creator of the Vitality program, encourage its health insurance customers to exercise more through using devices such as Fitbits or other activity trackers. Insurance will be cheaper if the customer increases the usage of the devices (Financial Times, 2017). Another report by *Jeanette McCarthy revealed in an online article "Genome" that the* Genomics is one of the most fascinating and transformational scientific advancements with myriad applications for the insurance industry (Mccarthy, 2014). Personalized medicine and the link with health insurance has been observed in a report of Nest Ideas regarding the Evolution and Revolution of tech transformation in the Asian insurance industry**.** Technology like diagnostics of scanning and machine learning process is more capable than that of physicians' and the capability will continue to increase in the future if growing data sets and sophistication of AI (Artificial Intelligence) continues to improve the output. In this report it has been predicted that the entire value chain of healthcare industry can be radically altered (Nest Ideas, 2017)**.** In addition, a report published by US National Academy of Health where some remarkable technological solutions were discussed regarding the health and the health insurance, such as VaR, Portfolio optimization and asset-liability, distributive decision model (Reid et al., 2005).

5. Evolving technological implication in Health Insurance

As the insurance industry is in the transforming phase and not adopted yet all the features of industry 4.0 under the cyber physical environment, the existing technological implication is not in static position (Noe, 2006 and Muller, 2015). In this scenario it may conceive that still maximum health insurance company is undergoing through information technology, electronic tools

applications and also programmable logic controller which allows increasing the operating efficiency due to the broad exploitation of programmable machines. And the beginning of the fourth industrial revolution can be dated from the year 2011, even though after the 4th revolution, the implication of evolving technologies is being piloted and tested to implement (Bitkom, 2016). Eling and Lehmann (2017) have deeply discussed the technological change in overall insurance industry and they categorized the change into three panel. The categorization has been displayed in Figure 2 to discuss the technological change is telematics devices are starting to be more integrated in health insurance through internet of things (Eling and Lehman, 2017). Adoption of artificial Intelligence (AI) also seems to be a beneficial evolving technology to the health insurer for claims management. Embedding artificial intelligence in the process of hospital claims management offers multiple benefits at once, not just for insurers but also for patients, given the opportunity to save (Kors et al., 2017).

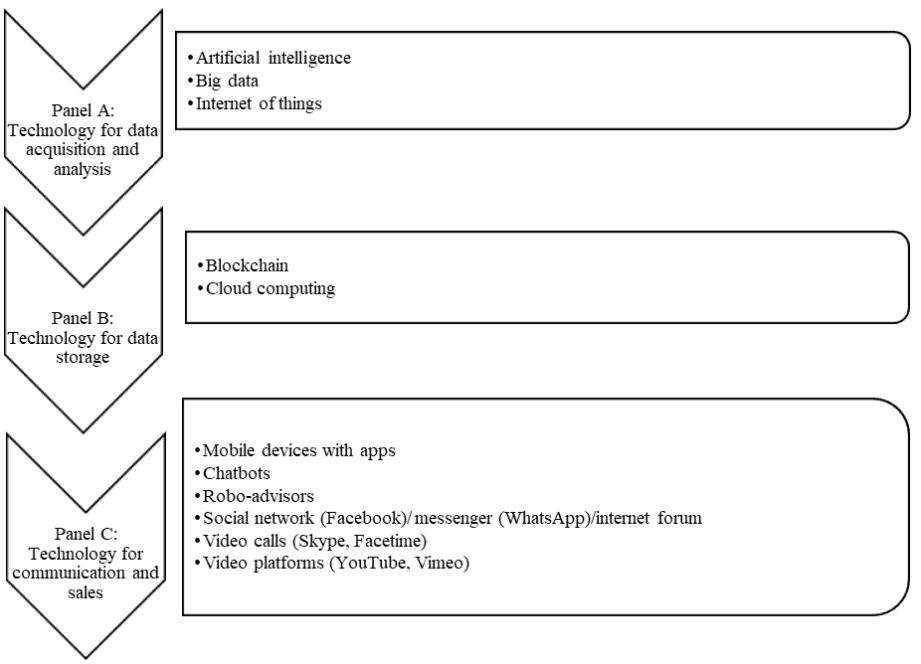

Figure 2: Technological changes

Mobile devices are also considered as the source of data creation and can link to various virtual storages. Some cloud-based virtual storage services can be

used with multiple devices (mobile, Tab & PDA) which allow uploading, sharing and managing files. These cloud-based storage services are reportedly compliant with both the Health Insurance Portability and Accountability Act (HIPAA) and the Health Information Technology for Economic and Clinical Health (HITECH) Act (Ventola, 2014). cloud-based virtual storages have been portrayed by Figure 3.

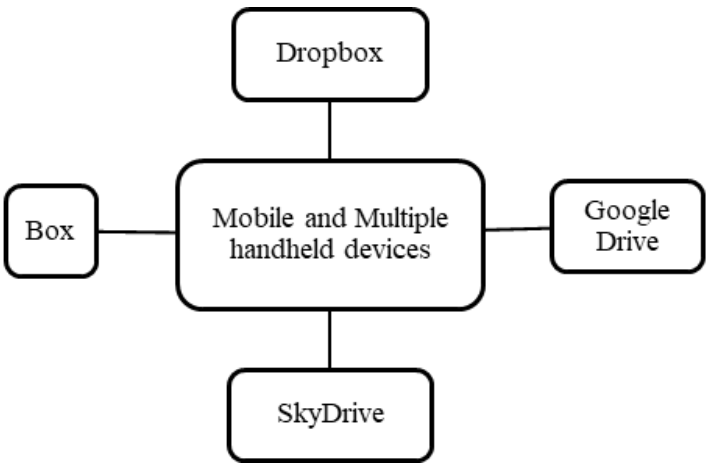

Figure 3: Cloud-based virtual storages

Besides that, Microsoft and Amazon also established huge virtual storages through Azure and EC2 respectively which works Infrastructure as a platform and is also cost effective (Eilig and Vob, 2016), though some cloud-based storage services are not compliant, and therefore may not be suitable for storing or exchanging patient information (Ventola, 2014). A report by GSMA in 2011, mentioned the insurer as player of healthcare and works as a intermediary where mobile health opportunities in this market are still in infancy, with some pilots being carried out by insurers and healthcare organizations to test out the value proposition, though the beginning of the industry cyber-physical revolution is perceiving since 2011 (GSMA Mobile Health, 2011). A report from Capgemini highlighted the 2018's top 10 technological trend in health insurance and pointed that the health insurance stands apart from the other Insurance sector (Swaraj et al., 2018). The top 10 recent technological trends have been imprinted below.

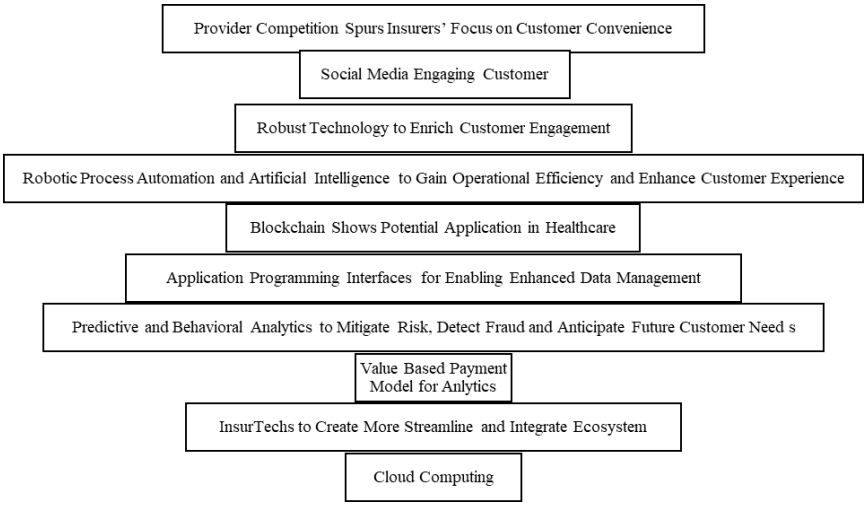

Figure 4: Today's technological trend adopted from Swaraj et al. (2018)

6. Pervasiveness in Accepting of the Evolving Technological Adoption in Health Insurance

Insurer

Even though the insurance industry including health insurance is a bit late to transform it into the cyber physical environment comparing to the other industries and health key players, the insurance providers are now rapidly implementing the evolving technologies (Noe, 2017; Muller et al., 2015). The benefits and the agility of the evolving technological implication proves the acceptance of cyber physical environment and the convergence of information and communication technology as well (Eling and Lehman, 2017; Kors et al., 2017; GSMA Mobile Health, 2011; Swaraj et al., 2018).

Consumer

On the other hand, technological transformation of the insurance provider took place because of the consumer pressure which clearly indicated the customer acceptance of the technological evolution. These days, consumers are empowered by technology and continuous evolution of customer behavior means insurers and providers must align their business models to focus more on customer preference and demand (Das and Datar, 2017). Moreover, the technology foresight by the European Internet Foundation which is a move

from mass collaboration to a "knowing society" proves the customer acceptance of evolving technology.

7. Challenges

Since the new transformation is all about adopting cyber physical environment or shifting the business process through the convergence of ICTs, the transformation contains some IT risk. In 2018 the Geneva Papers on Risk and Insurance have discussed some cyber risk. The editorial report highlighted that many experts fear that in some cases, cyber losses are heavy-tailed and highly correlated. In that report an example has been drawn, that all companies use the same software. If cyber losses are heavy-tailed, there is the question of the extent to which the diversification of cyber risks possible or whether a non-diversification trap exists. They also noted that the focus of databases today is on data breaches and information for other types of risk or other countries is scarce. Another report by IBM in 2015 have also discussed about going Industry 4.0. The discussion prioritized not only the cyber risk, also business interruption risks, reputation risks, macro environment risks and skill/talent risks.

Another fact is that to build a successful AI claim management system, the development and testing of a suitable cognitive system is very significant. The McKinsey has remarked about six 6 determinants of a successful AI implementation. Unable to meet a single determinant can make the risk the successful implementation (Ventola, 2017).

Cyber risk seems to be a challenge to the health insurance industry while transforming the business process, as the problem is still in infancy position to maximum company. Besides that, implementing the big data, cloud computing and IoT have been observed as a challenge to the health insurance industry.

8. Conclusion and Managerial Implications

It has been endeavored to uphold the contemporary technological scenario of health insurance through this study. In addition, the effort has been enhanced to investigate in further regarding the simultaneous progression in perspective of evolving technology acceptance and implication. It is expected that the obtained state-of-the-art health insurance system will aid towards further

related research and positively contribute towards the overall digitalization of health insurance.

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