Impact of Technological Innovations on Life Insurance Business Continuity

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Innovations in technology have always had an impact on all spheres of life, including businesses. The impact of technological innovations on life insurance business is analysed in this paper.

Introduction

Innovations have always had an impact on human society and have revolutionised the way our civilization has evolved. Right from the discovery of fire to quantum computers, all innovations have continued to influence every aspect of human endeavor. Many of these innovations are technological in nature, heralded by the Industrial Revolution and had the maximum impact on world economy. Though some technological innovations had a strong and immediate impact, others took time to impact businesses.

The rate of technological innovations is another factor which is important. With the passage of time, the rate of technological innovations has increased exponentially. Some technologies, which came into existence during the early stages of industrial revolution, were modified, others were replaced and some even became obsolete after a considerable lapse of time, e. g. the steam engine. On the other hand, some of the recent technological innovations have led to the birth of other devices and technologies thus becoming obsolete within a few decades or even a few years of their launch, for e.g. pager, bradma, wireless in local loop technology (WLL). The most important aspect of the technological changes is the way these affect businesses, alter business models, and launch or eliminate even products and services.

Life insurance business has also been affected by technological changes. Industries, like life insurance, which basically deal with data and information processing have been mainly impacted by the recent technological innovations in computing and communications. Moreover, innovations and developments in the medical field have had direct impact on life insurance business as well. However, if we want to assess the impact of technological innovations on life insurance business,

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we must also have a holistic view of the technological impact on society as a whole and not be limited exclusively to one particular industry.

Why should we concentrate on life insurance business continuity when talking about technological innovations? Life insurance business is a long-term business which requires long-term planning. The cash flow and its investment in life insurance have a long-term horizon. Even a new life insurance company takes around seven to eight years to break-even and thus needs to plan and strategise accordingly. If the technological innovations impacting life insurance business are not diligently factored into the total business strategy of the company or even the industry, it may be saddled with legacy issues which it may find difficult to cope with. Hence a holistic understanding of the total business will also help in long-term manpower planning, skill development strategy, operational planning, selecting investment avenues, introduction of Information Technology (IT), infrastructure development and even the choice of appropriate business model/s.

Method of Analysis

As the scope of the subject is quite extensive, the paper tries to analyse the following three main dimensions of the impact of innovations in technology on life insurance business continuity.

A. The first dimension in the analysis is the approach to the topic itself. A two-fold approach is adopted here:

   (a) In order to understand the impact of recent technological innovations, the question to be asked is: Is the application of such innovations implementable, and, do these have a direct bearing on life insurance businesses *per se?* This includes innovations in technology that are related to: (i) Internet, such as: e-commerce and social media, (ii) Cellular, satellite and database communications, and (iii) data analytics on databases like UID project.

   (b) Understanding the impact of current technological innovations which are futuristic in nature. These innovations at this point of time may not seem to be affecting the life insurance business but would have future ramifications. The impact of such technological innovations would be in robotics and automation, genetics and medicines, advanced computing and communications, energy and climate change and so on.

With these perspectives in mind, the next big question is: What should be the criteria for short-listing the technological innovations amenable to both the approaches. For the first approach, I have considered some current or recent technological innovations (Table A).

Table A: Recent Technological Innovations

Technology	*Innovations in*
Internet	Connected devices of internet
Internet	Communication technology
e-commerce application	Web-based and apps-based on internet
Social media application	Web-based and apps-based on internet
Database and analytics	Database on Indian citizens : Unique Identification Number (UID) – Aadhaar

For the second approach, some standard technological innovations need to be used and their impact on life insurance business has to be analysed. However, in the absence of any standard benchmark for such short listing, the approach adopted was to search the internet with the help of search engine (Google to be more specific) for the topics related to "technological innovations" and "10 Breakthrough Technologies" of MIT Technology Review (available at https://www.technology review.com) was chosen as a reference point. From this website the 10 breakthrough technologies for each of the 5 years (starting from 2016 and going backwards to 2012) were shortlisted. The list is given in 'Summary of 10 Breakthrough Technologies' each for Years 2012 to 2016 (given in Annexure 1).

B. The second dimension in the analysis is to assess what factors of life insurance business would these innovations impact. We have split the factors into two:

   (a) *Impact on Demand* for life insurance solutions or products – Prospective clients and Customers

   (b) *Impact on Supply* of life insurance solutions or products – The Life Insurance Industry

Demand is simply a "need" backed by "capacity to pay". The demand for life insurance business arises from the need to manage the financial risk associated with untimely death (demand for life-cover, including endowment type, and investment products bundled with the life cover, since we are dealing specifically in the Indian context) and manage the financial risk associated with longevity (demand for annuities/pensions). Here, we have not included the impact on health insurance business. The capacity to pay or fund the insurance is another important aspect which influences the priority of purchase and continuity of insurance.

The question is: Which of the major technological innovations would impact these two basic factors – the "need" and the "capacity to pay" – for life insurance and how? We start with an assumption that past innovations have already impacted the demand. Then we will scan the

environment for current and plausible future technological innovations. The innovations that can impact demand may be the ones that affect the medium of communication (internet), longevity (medical, environmental), livelihood or earning capacity (automation or technology that affects productivity and job creation).

Supply or industry response to these technological changes arises depending on how much disruptions these can cause and how proactively or reactively the industry can respond. Innovations offer both "opportunities" as well as "threats". The actual response of the industry to opportunities and threats will determine the real impact on life insurance business.

C. The third dimension to be assessed is the time frame and severity of the impact.

Time Frame	***Severity***
(a) Immediate (currently)	(x) Low positive or low negative
(b) In the near future (2 to 7 years)	(y) Medium positive or Medium Negative
(c) In the far future (7 years or more)	(z) High positive or High Negative

Based on the above framework, the topic is analysed and accordingly the response which the insurance industry could plan is shortlisted. The ultimate crux of the solution would depend on how proactively and quickly the industry can respond. This will determine the future or continuity of life insurance business.

D. Recent Technological Innovations and Its Impact on Life Insurance Industry

Of late, huge progress in the domains of electronic data storage, computing and communication has been made, and, gradually these three aspects have converged. The advancement and convergence of these three factors have immensely benefited various industries like travel, trade, tourism, banking and insurance, which depend heavily on information processing.

Let us take the technological innovations given in "TableA" above and analyse them and assess their impact on life insurance business continuity.

1. Internet including e-commerce and social media:

What started as a concept of "Galactic Network" (a globally interconnected set of computers through which everyone could quickly access data and programs from any site) by J. C. R. Licklider in Massachusetts Institute of Technology (MIT) in August 1962, has now become the internet.[2] It has revolutionised and transformed all spheres of human activity, be it economic, social, political, *et al*. The most simplistic model of Internet is a platform consisting of : (a) Connected devices (stationary or mobile - like servers, routers, gateways, PCs,

desktops, basic mobile phones, smartphones, tablets, notebooks, laptops, etc.), and (b) Connecting technology (cable, fibre optics, fixed-line telephone network, mobile network, satellite network, etc.) *(Annexure 2).*

The combined effect of innovations in technology of connected devices and connecting technology has led to the reduction in the per capita fixed as well as the variable costs of internet usage. This has led to the wide proliferation of internet, which is now accessible and used by vast and varied sections of the population (Table B). In fact it is well on its way to becoming "UNIVERSAL". Talking about the Indian market, the access and usage of internet have grown exponentially as can be seen from the Table B.

Table B: Number of Internet Users in India

Year	*Internet users in India*	*Source*
1998	25000	Economic Times, 16.11.2011 by Arun Balakrishnan CEO, BerkshireInsurance.com
2010	100,000,000	
October 2013	200,000,000	Insurance @ Digital - 20X by 2020 of BCG
December 2015	306,000,000	http://indianexpress.com/article/technology/tech-news-technology/mobile-internet-users-in-india-to-reach-371-mn by-june-2016/
June 2016	371,000,000 (projected)	

The current innovations in allied technologies of internet have influenced economic activities directly through electronic commerce or e-commerce. The simplest definition of commerce (in high school book) is 'activities which lead to removal of hindrances of person, place and time.' The activities which are undertaken to remove these hindrances carry "TRANSACTION COST". The decrease in transaction cost consequently leads to increased commercial activities. The internet today has resulted in massive reduction of these transaction costs and thus it has led to an exponential rise in electronic commercial activities.

2. Impact of Internet on Life insurance Business – "the supply side"

Marketing: In the manual system of prospecting for life insurance, need-assessment is made mainly after meeting the prospective client and analysing the information given by him/her. Internet is a huge source of data for users depending on their need, and, which can be effectively mined for need-assessment even before visiting a client. For example, search engines like Google provide a vast amount of data on every aspect on the types and topics of searches made by internet users. A person who searches the internet keying in words like "retirement", "pension", "life after sixty", or other related topics can access the targeted annuity or deferred pension plan in a jiffy. Similarly, searches with words like "children",

"education", "marriage" can be targeted for children's education schemes or marriage endowment plans. Such data are being mined by various commercial organisations, including life insurance companies, for marketing their products and services. Targeted marketing, depending on the customer's pattern of usage of the internet is the main strategy employed in online marketing. "Search engines like Google are also quickly becoming key tools to provide insights into people's interests, intentions and future actions."[5]

Distribution: Internet has given rise to "online channels" for marketing and sales of life insurance products. This channel is far cheaper than conventional channels like individual agents, bancassurance, corporate agents and brokers. Though the potential of this channel is not yet fully harnessed, yet in future this channel is expected to play a major role in the distribution of life insurance products. If we take the example of some of the advanced economies like the US, the life insurance digital channel sales in terms of annualised premium is about $2 billion (4 per cent) and for Germany it is about $500 million (4 per cent).[5] In India the life insurance sales through online media is around Rs. 300 crore.[5] As per the IRDAI Annual Report, 2015-16, the usage of online channel is just in its initial stages and its contribution to individual new business performance for life insurance on premium basis is just 0.52 per cent[6] (1.10% for private insurers[6] and Rs. 47.06 crores[7] or 0.07% [6] for LIC of India).

Servicing : The cost of servicing life insurance policies via internet is much lower than through conventional branch offices mainly due to two reasons : (i) low cost of transactions through internet, and (ii) higher persistency as the purchase of insurance is mainly demand driven. According to the "Life Insurance Benchmarking Survey Report", undertaken by the Boston Consulting Group (BCG) and the Federation of Indian Chambers of Commerce and Industry (FICCI), online channels are more effective and have greater persistency compared to any other channels. The differential between persistency of online and physical channels is approximately 18% in terms of premium for the 13th month with online channel at around 80% compared to 62% for physical channel. Similar differentials exist for the 25th, 37th and 49th months.[5]

An example taken from the Indian Banking industry shows that the typical cost of a banking transaction is between Rs. 40-50 for a branch, Rs. 13-17 for an ATM, Rs. 8-10 for the call centre, Rs 4-6 for an offline Business Correspondent (BC) model, Rs. 2-4 for online BC model, Rs. 0.2-0.5 for internet and less than Rs 0.2 for mobile.5 Thus the transaction cost over internet and mobile is approximately 1/200th of the cost through physical branches. Similarly, if we compare some of the transaction costs in life insurance servicing, like sending a renewal reminder @ Rs. 0.14 per SMS (http://www.indiasms.com/) through mobile and approximately Rs. 6 (printed book post) through postal services, we find that cost through the

online mode is approximately 1/40 times lower than through physical means. Use of EDA for various services like cash collection has reduced the transaction costs considerably and enhanced customer satisfaction by reaching him/her at the doorstep. This has also resulted in lowering the lapsation of low ticket policies.

Claims: Internet serves as a convenient platform for settling of claims. The issue of maturity vouchers online helps reduce cost and speed up the process of claim settlements. The linkage of e-mail and mobile for follow-up for settling a claim increases customer satisfaction. Electronic transfer of funds has reduced cases of wrong payment and also reduced cost of transactions. The country's largest life insurer, Life Insurance Corporation of India, which has the highest policy payout in terms of number and amount has settled 2.96 crore policy payments amounting to Rs. 1,06,639.48 crore, (88.87%) through National Electronic Fund Transfer (NEFT).[7]

Online Insurance Fraud : The two basic types of life insurance frauds are: (i) Seller fraud (ghost companies, premium theft, churning, over and under coverage), and (ii) Buyer fraud (post-dated life insurance, false medical history, murder for grabbing proceeds, lack of insurable interest, suicides, faking of death and disability). Internet has ushered in the era of e-commerce and faceless transactions; though the nature and type of frauds are the same, the technique of committing them has changed.

Online life insurance means transacting with a faceless entity. The main techniques of comitting online insurance frauds include impersonation and identity theft as absence of physical presence is the key to fraud. Recently, cases have come to light of people impersonating as IRDAI officials, making spurious calls which have harassed and cheated some members of the public. Though the Insurance Regulatory and Development Authority of India (IRDAI) has been alerting the insurers since the year 2011, and, has repeatedly cautioned the public through notices and various publicity campaigns, yet the nefarious activity continues and many still get trapped and defrauded. In some other cases the crooks get access to the database of the insurance company either by stealing or by hacking. They use the data to make spurious calls to customers of the company luring them with attractive offers. They also make phone calls, use online techniques like e-mail, fake website, etc. Many people have fallen prey to such frauds and lost substantial amounts of money.

On the other side, the recent amendment in the Insurance Act makes it very difficult for insurers to reject life insurance claims beyond three years. This has lead to a spurt in fraudulent death claims by both customers and distributors.8 Generally in an offline environment, the agency's personnel as well as the physical scrutiny of the network at offices act as check and

the first-line underwriting is done by them which is limited or absent in online environment. Thus, in online sales the biggest challenge is to detect such cases within 3 years so as to nullify the fraudulent intentions.

Beyond these, life insurance will always be vulnerable to other types of online frauds, which the other financial sectors also face. Thus, as already discussed, the skill requirement of the industry must be appropriately geared to match the changing environment. The legal framework of cyber laws must be incorporated into the day to day activities of the life insurance companies to deal with the increased incidences of online frauds and other cyber crimes.

Thus, we have seen that innovations using the internet effectively reduces costs and ultimately the price of life insurance. Online term plans are on an average 40% cheaper than the offline options.[9] Technology has also improved the servicing standards of insurance and more improvements are in the pipeline. Despite the challenges and incidences of online frauds, the positive impact of internet has already started to show results in the life insurance business and has the potential to have higher positive impact in the near future.

3. Impact of Internet on Life Insurance Business – "The Demand Side"

Life insurance business has always been a supplier-driven business making use of intermediaries having direct human interactions. The skill requirement, the marketing and the communications aspects of the industry have been fine-tuned accordingly. Now and in the future, we have a scenario where Generation Z[10] (also known as Post-Millennial, who have high exposure to internet from a younger age group) will form the bulk of the prospective clients of life insurance business. The internet has a huge impact on the social behaviour of this generation. This generation is techno-savy with e-mail, chat, whatsApp, facebook, search engines, multimedia, video chat, animation, and, this group is ready to lap up any new invention that technology can offer.

In the age of internet and e-commerce, the shift in the nature of life insurance business will be from being 'sales-driven' to 'demand-driven'. This trend is quite clear from the fact that there has been 4.5 times growth in Google search query for life insurance in India during the period 2008 to 2013.[5] This shift is already forcing insurers to change their distribution orientation. Adjusting to e-commerce in life insurance and scenario of demand-driven trend will throw up challenges and threats of "Channel conflict". Almost all the players in the arena of Indian insurance market use the multi-channel approach. The share of individual agents, who are most likely to be affected by this demand-driven approach, in individual life insurance new business premium is 68.27% (96.50% for LICI and 31.90% for Private players).[6] The strategy

to manage the immediate business goal through current business model and being forced to change according to the environment will be the biggest challenge that the life insurers will have to face.

The influence sphere and pressure for life insurance purchase is shifting from relatives, seniors at the place of employment and "Agent uncle" to "Facebook friends", "WhatsApp pal" and "Professor Google". The challenge before the insurers will now be: how to capture the mind space of this generation and generate interest for life insurance through these channels of influence. It is estimated that by the year 2020, in 75% of the cases related to decision making regarding pre-purchase, purchase or renewal of insurance policies, the various digital channels will have a major role to play.[5]

The impact of the internet on the current and future generations will force the insurers to have a relook at the skill requirements as well as the communication skill in marketing of the life insurance business itself. The presence of the insurers in the social media like the facebook, twitter, whatsApp, etc., has now become a must. The impact of internet on demand-side of the life insurance business will also depend on the competitive response of the industry. Competitive here means 'how better and faster' the industry can project life insurance as a financial ally compared to other competing financial avenues that the client has access to.

What the initial trend suggests is that internet is already altering the traditional product matrix of the life insurance industry. The demand now is more for pure term insurance, health insurance, ULIPs and pension – probably in the order cited. Thus, internet can have medium positive impact or even has the potential to have medium negative impact if not handled diligently, and, this impact is already visible now and will be revealed further in the near future.

4. Aadhar – UID

This is a revolutionary scheme of the Government of India, which provides a Unique Identification Number to its entire citizenry. It captures various details like name, date of birth, address, biometric data like finger print and retina scan. Already, 109.87 crore Indians[11] have been enrolled under this scheme and have been alloted an individual Aadhar number. This is also being linked to various other databases having bank account number, PAN, LPG consumer number, Passport, Voter Card and Digi Locker. Aadhar-linked digital life certificate named as "Jeevan Praman for Pensioners" is an initiative which is being launched by the Department of Electronics and IT.[12]

Impact of UID on Life Insurance Business

This huge database will help insurance companies in designing life insurance products especially for life insurance inclusion. It also provides great opportunity in terms of targeted subsidy for the

needy and the poor so as to include them in the life insurance ambit. The recently floated life insurance scheme of the Government of India, *Pradhan Mantri Jeevan Jyoti Bima Yojana,* which aims to provide life cover of Rs. 2 lakh to an individual having a bank account uses AADHAR as the main (Know Your Customer) KYC condition to avoid duplication of lives insured based on multiple accounts in the same or multiple banks.

The linkage of Aadhar to various databases will help insurers to better prevent life insurance frauds. The quality of data captured including bio-metric information can play a crucial role in the identification of the deceased and help in the settlement of genuine death claims and prevent fraudulent death claims based on forged identities. Other types of frauds, like suppression of adverse medical history, can be detected using AADHAR. For instance, a scenario may develop where AADHAR linked to health insurance policies may be used by a life insurer to access the medical history relevant to fradulent life insurance claims. Similarly, it can also be used for tracing and tracking linkages with bank accounts to manage other incidences of frauds. It can also reduce incidence of annuity frauds as the Jeevan Praman for Pensioners will be unique life certificate for an annuitant easily accessible by all life insurers. It will also act as one certificate to fulfil the requirement of multiple polices held with various insurers providing annuity.

Thus, the insurers stand to benefit from the UID project and the database is ready to be harnessed and even the prospective insured, especially from lower income groups or socially backward sections of society, stand to benefit from the utilisation of AADHAR in the near future.

Data Analytics – For Fraud Detection

When services like life insurance are offered by multiple players through multiple channels, the initiative and incentive for committing frauds by the entities availing the services are also very high. The ideal way to prevent as well as detect frauds would be by the service providers collaborating mutually and sharing information on real time basis The tremendous progress made in computation technology and storage of data (Cloud storage) have made data analytics far more advanced and advantageous for life insurance business operations. This capability has especially facilitated fraud management (prevention and detection) both at the individual company as well as industry levels.

The laudable initiative by the regulator, IRDAI, in creating the Insurance Information Bureau (IIB) of India is taken with the objective of creating a databank of insurance in India for using it for data analytics for the benefit of the entire industry. The standardisation of the data format and the advancement in data analytics have helped the IIB to come out with many studies and reports related to various types of insurance, including life insurance. The Life Insurance Council is also working towards a fraud monitoring framework. In fact M/s Experian India, with expertise in fraud

detection in the banking system, have been shortlisted for the job.[6] Already this organisation, which has 15 life insurance companies as clients, has launched the "Hunter Fraud Management Services" as a Closed User Group (CUG) sharing data for fraud detection.[13]

Data Analytics – For Other Tasks

We have already asserted that life insurance is a business which processes information and data. All life insurers are investing heavily to acquire the latest hardware, software and human resource capabilities in data analytics. Hence, technological innovations in data analytics is already helping life insurers in targeting prospective clients, marketing, granular pricing, better underwriting, customised servicing, besides prudent investment decision making. In simple words, application of data analytic technique to life insurance can be compared to the use of innovative diagnostic science in healthcare services.

Table C: Impact Assessment of Recent Technological Innovations

Technological Innovation	*Likely Impact on Life Insurance Business*			
	Supply Side		*Demand Side*	
	Severity	*Time frame*	*Severity*	*Time frame*
Internet (Overall – including e-commerce and social media)	Medium to high positive	Immediate	Medium positive to medium	Immediate to near future negative
AADHAR	Medium positive	Immediate	Medium positive	Immediate
Data Analytics	Medium to High positive	Immediate	Medium positive	Immediate

5. Current Technological Innovations That are "Futuristic" in Nature

We have already seen in the earlier section that the impact of technological innovations of the recent past is clearly visible, and, accordingly, the insurance industry can continue to react to these. However, the impact of current technological innovations, which are yet to be manifested fully, is difficult to predict. These have implications which are yet unpredictable but may have great potential in the future. Thus, the industry has two options to deal with them – proactively or reactively. Proactive action will entail planning and lining up changes accordingly, while reactive action will consist of watching and then reacting at the opportune time in the best possible manner.

We have already shortlisted 50 such breakthrough technologies of the past 5 years in Annexure 1 *(given at the end of this article)*. From this list we categorise breakthrough innovations into

groups like Robotics and Automation, Genetics and Medicines, Advanced Computing and Communications, Energy and Climate Change and Miscellaneous.

i) Robotics and Automation:

Imagine a world with driverless car, drones to home deliver consignments, drones which help farmers to tackle the menace of diseases and pests that cause crop loss, legged robots for rescue operations in difficult terrains, easy to interact robots in industrial or commercial environment and robots learning tasks to teach other robots. Well, this is not a science fiction film but possible technological breakthrough scenarios or innovations in robotics and automation. The next question will be: how will these innovations affect life insurance business? Well, to-date we have not yet seen any visible impact but on digging deeper we may be in for some real surprise.

Demand-side Impact: The biggest perceived threat of robotics and automation is the job loss, shift in the nature or content of employment as well as the earning capacity. Employment in labour-intensive sectors like agriculture, logistics, sanitation, manufacturing and even retailing will be greatly impacted by these innovations. According to the World Bank, it is estimated that 69% of the jobs in India will be lost due to Automation, [14] including new sectors like IT. Its report, "Hfs Research", predicts that the IT sector in India will lose 6.4 lakhs of "low-skilled" jobs due to automation by 2021.[15]

The earning capacity of many individuals will be negatively affected and many jobs may even vanish. The need for life insurance will be subjected to absence or reduced capacity to pay the insurance premium, and, hence, the demand for life insurance may be adversely affected. The impact can be low-negative to even high-negative in an economy which is quite labour intensive and this may be manifested sooner than later.

Supply-side Impact : The wide-spread usage of robotics in future for disaster relief and rescue operations offers the insurers the opportunity to better manage risks related to catastrophies, and loss in life insurance business due to natural calamities like earthquake, flood, tsunami, landslide or even nuclear disaster. In 2005 after the disaster of hurricane Katrina in Gulf coast, robots fitted with camera, microphone and sensors searched for stranded victims in flooded homessteads and rooftops and helped in relief and rescue operations.[16] Eleven years down the line, the innovations in robotics is manifold and in future it will help in large scale rescue operations thus reducing catastrophic loss of lives due to natural calamities and help reduce claims' outgo of life insurers.

ii) Genetics and Medicines:

Another field which is ever dynamic and is undergoing major changes due to technological breakthroughs and innovations is genetics and medicine. Precise gene editing in plants, DNA Appstore, Genome editing, Pre-natal DNA sequencing and Nanopore sequencing under genetics and immunology engineering, liquid biopsy, brain organoids, internet of DNA, brain mapping, microscale 3d printing, memory implants and egg stem cell under medicines are some of the areas which have seen major breakthroughs recently.

Demand-side Impact: Most of the technological developments in the areas of medicines and genetics are predicted to increase the longevity of human beings. Especially innovations like immunology engineering, liquid biopsy, and internet of DNA will help better treatment of diseases hereto incurable and increase the productive life of an individual. The increase in longevity may also lead to lesser mortality rate and reduction in the price of life insurance products. This will help trigger the demand for life insurance by certain segments, like people who are affected by cancer, which has not been addressed upto now by many of the life insurance companies. Apart from this, the increase in longevity will favourably affect the demand for pension and annuity products.

Supply-side Impact: The improvement in various diagnostic aspects like liquid biopsy, nanopore sequencing, and prenatal DNA sequencing offer immense opportunities for better medical underwriting and classification of life insurance risks. The data on mortality due to various ailments collected over time along with improved diverse diagnostic methods will lead to better and more scientific pricing of life insurance products.

iii) Advanced Computing and Communication

The current phase of changes in life insurance industry has been mainly catalysed by improvement in computing and communication. The most prominent innovations in the last five years in the field of computing and communication have been the advancements in various technologies like: Conversational Interfaces, Slack, Magic Leap, Project Loon, Ultra Private Smartphones, Neuromorphic Chips, Mobile Collaboration, Oculus Rift, Smart wind and Solar Power, Smart Watches, Deep Learning, Big Data from cheap phones, Temporary Social media 3-D Transistors, Faster Fourier Transform, Facebook's Timeline. Some of these innovations like Facebook and smart watches have already been factored in our earlier sections.

Not all of these innovations in advanced computing and communication are likely to have an impact on life insurance business but some of the following do have the potential.

(a) ***Project loon*** is designed by which Helium balloons help in providing reliable and cost-effective way to beam Internet service from the sky at places where transmission via towers is not feasible. . It is expected to cover 4.3 billion people who are offline. One can very well understand the huge dividend it can pay for e-commerce, in life insurance business and especially in life insurance inclusion.

(b) ***Conversational interfaces*** combine voice recognition and natural language understanding to create effective speech interfaces for the world's largest internet market. The i-cube report titled, "Internet in Rural India" contains important findings which indicate that the rural internet population is not comfortable in accessing English, and, about 42% of the internet users prefer the local language.17 This technology will make the use of internet easier, intuitive and inclusive, and, will help even those not conversant with the English language or individuals with low or no computer literacy to readily adapt and use internet more easily.

(c) ***Slack*** is an easy to use communication software and provides a centralized place to communicate with colleagues through instant messages and in chat rooms. This can reduce the time the workforce spends on e-mailing and thus increase productivity. Mobile collaboration service – a productivity software for software era – makes it convenient to create and edit documents on mobile devices. These two technological advancements have the potential to reduce turnaround time for processing a request and thus lead to increased productivity of the workforce in insurance business where most of the jobs are based on processing information and communication.

(d) ***Ultra-private smartphones and temporary social media*** are innovations designed to protect the privacy of users and may have an adverse effect on marketing through online platform.

(e) Big data from cheap phones is used for collecting and analysing information from phones to have an insight into how people move and behave. This has further been developed by a researcher at Harvard School of Public Health and lead to the understanding of the spread of various diseases. No doubt such efforts can help in managing and eradicating epidemics like malaria and reduce mortality rate.

Thus, the advancement in computing and communication technologies will help in increasing the penetration of internet, especially mobile internet, and will facilitate e-commerce. This will have an impact similar to that of internet, which will be manifested in the near and far future.

iv) Energy and Climate Change:

The current focus on clean energy, especially in the light of climate change, has gained momentum after the United Nations Framework Convention on Climate Change. The recent developments in this field include: Solar City's Gig Factory, Ultra Efficient Solar Power, Solar micro grids, Super grids, Ultra efficient power pioneered by various leading corporates and institutions. These are giant leaps to make solar power a cheap source of alternative energy so that reliance on fossil fuels could be effectively curtailed. This will lead to controlling and containing the ill-effects of climate change. Ultimately the impact of catastrophic events like flood, forest fire and glacial melting will be contained and loss of lives through such catastrophic events will reduce claim payouts of the life insurers.

Other technological innovations in the field of energy include: power from air to address which will help wireless gadgets that repurpose nearby radio signals, such as Wi-Fi, to power themselves and communicate thus freeing internet from the constraint of batteries and power cord. High-Speed Materials Discovery has paved a new way to identify battery materials suitable for mass production. This could revolutionize energy storage which will have application in furthering the propagation of internet. This, as we have seen in earlier section on internet will widen the net for e-commerce of life insurance.

v) Miscellaneous Technological Innovations:

Some of the other technological innovations of the last five years, which may have an impact on life insurance business, are:

(a) Mega scale desalination and supercharged photosynthesis which will enhance food security and address the issue of water scarcity, thus reducing mortality especially in the undereveloped and developing countries.

(b) Apple Pay for creating faster and secure way of online payments and thus enhancing e-commerce.

Table D: Impact-assessment of Current Technological Innovations that are "Futuristic" in Nature

Technological innovation	*Likely impact on life insurance business*			
	Supply side		*Demand side*	
	Severity	*Time frame*	*Severity*	*Time frame*
Robotics and Automation	Medium positive	near future	Medium to High negative	Near to far future
Genetics and Medicines	Medium positive	Immediate to near future	Medium positive	Far future

Advanced Computing and Communication	Same as Internet technology *(see Table C)* as these in effect lead to higher penetration of internet		
Energy and Climate Change	Low to medium positive	Near to far future	Same as Internet technology *(see Table C)* as these in effect lead to higher penetration of internet
Miscellaneous Technological Innovations	Low to medium positive	Near to far future	Same as Internet technology *(see Table C)* as these in effect lead to safer e-commerce

Conclusion

The macro-economic analysis, or the PEST (Political, Economic, Social and Technological Environment) is used for understanding the future prospect of any business. We have closely observed that technology is an important catalysing factor as it has cascading effects. It affects both social and economic environment. Thus, while assessing the impact of technological innovations on life insurance business, we have tried also to include the impact of the social and economic factors induced through technology on life insurance business as well. Therefore the following conclusions can be drawn:

1) Technology is ever evolving, hence the business strategy of life insurance should be dynamic in nature. In fact, it should be pro-active and not reactive.

2) The use of technology can be highly disruptive and reputation does not matter? The customer is more empowered and techno-savy, hence the value created during 'provider-user-relationship' must be passed on to the customer.

3) The traditional distribution model will be under stress and managing channel conflict with shift to technology-based distribution will be the key to success. Not only distribution but legacy issues of human resource and the generation gap must be taken into account when strategising for the future.

4) Many futuristic technological innovations will offer manifold opportunities but the effect of some of these will pose major threats to the life insurance business. How the life insurer identifies these opportunities and benefits from them and mitigates the threats will be the key to survival.

This paper does not make any judgement but merely tries to concisely analyse the topic in its various perspectives. In fact it can be said that there exists no technology to predict what will be the impact of technological innovation on life insurance business continuity.

Annexure 1

Summary of 10 Breakthrough Technologies Each for Years 2012 to 2016

Sr. No.	*Technological Innovation*	*Subject*	*Year*	*Brief Description*	*Objective of Developing the Technology*	*Key Players*
1	Immune Engineering	Medicine	2016	Genetically engineered immune cells to save lives of cancer patients. Killer T cells programmed to wipe out cancer	To treat cancer, multiple sclerosis, and HIV by engineering the immune system	Cellectis, Juno Therapeutics, Novartis
2	Precise Gene Editing in Plants	Genetics	2016	New gene-editing method provides a precise way to modify crops to make them yield more and resist drought and diseases more effectively	To increase agricultural productivity for feeding the world's growing population, expected to reach 10 billion by 2050	Sainsbury Laboratory and John Innes Centre, Norwich, UK ; Seoul National University; University of Minnesota; Institute of Genetics and Developmental Biology, Beijing
3	Conversational Interfaces	Communi-cation	2016	Combes voice recognition and natural language understanding to create effective speech interfaces for the world's largest Internet market	To reduce the time-consuming and frustrating effort in interacting with computer data entry	Baidu, Google, Apple, Nuance, Facebook
4	Reusable Rockets	Others	2016	Rockets usually are destroyed after their maiden voyage. But now these can make an upright landing and be refuelled for another trip, setting the stage for a new era in spaceflight	To lower the cost of space flight; to facilitate many new endeavours in space exploration	SpaceX, Blue Origin,, United Launch Alliance

Sr. No.	*Technological Innovation*	*Subject*	*Year*	*Brief Description*	*Objective of Developing the Technology*	*Key Players*
5	Robots to teach others	Robotics	2016	Robots that learn tasks transmit their knowledge to the cloud for other robots to pick up signals later	To accelerate dramatically the progress in progarming robotics and eliminate reprograming of individual robots	Ashutosh Saxena, Brain of Things, Stefanie Tellex, Brown University, Pieter Abbeel, Ken Goldberg, Sergey Levine, University of California, Berkeley, Jan Peters, Technical University of Darmstadt, Germany
6	DNA App Store	Genetics	2016	A new business model for DNA sequencing to make genetic information widely accessible online	To study the genome that reveals a great deal about an individual, including possibility of contracting certain diseases	Helix, Illumina, Veritas Genetics
7	Solar City's Giga Factory	Energy	2016	Highly efficient solar panels made using a simplified, low-cost manufacturing process	To invent an efficient technology for making solar industry more competitive and efficient than fossil fuels	Solar City, Sun Power, Panasonic
8	Slack	Communi-cation	2016	Easy-to-use communi-cation software to supplant e-mail as a method of getting work done. Slack facilitates centralized communi-cation with colleagues through instant messaging. Chat rooms, which can reduce the time spent on e-mailing	To enhance productivity in different workplaces, the "water cooler" effect lets people overhear their colleagues' conversations	Slack, Quip, Hipchat, Microsoft

Sr. No.	*Technological Innovation*	*Subject*	*Year*	*Brief Description*	*Objective of Developing the Technology*	*Key Players*
9	Tesla Autopilot	Robotics	2016	The electric-vehicle maker uses on its cars a software update that has suddenly made self-driving a reality	To reduce car crashes caused by human error that kill thousands of people a day worldwide	Ford Motor, General Motors, Google, Nissan, Mercedes, Tesla Motors, Toyota, Uber, Volvo
10	Power from Air	Energy	2016	Wireless gadgets that repurpose nearby radio signals, such as Wi-Fi, to power themselves and communicate	To free internet-connected devices from the constraints of batteries and power cords and enable many new uses	University of Washington, Texas Instruments, University of Massachusetts, Amherst
11	Magic Leap	Communi-cation	2015	A device that creates 3D imagery and makes virtual objects appear as in real life	To provide new opportunities for the film, gaming, travel, and telecommunications industries	Magic Leap Microsoft
12	Nano Architecture	Others	2015	Tiny lattices with enormous potential. Materials whose structures can be precisely tailored so they are strong yet flexible and extremely light	To provide lighter structural materials that would be more energy-efficient and versatile	Julia Greer, Caltech, William Carter, HRL Laboratories Nicholas Fang, MIT Christopher Spadaccini, Lawrence Livermore National Laboratory
13	Car to Car Communication	Robotics	2015	Wireless technology to make driving safer. Cars that can talk to each other to avoid crashes	To prevent road accidents due to car collisions which kill millions worldwide every year	General Motors, University of Michigan, National Highway Traffic Safety Administration

Sr. No.	Technological Innovation	Subject	Year	Brief Description	Objective of Developing the Technology	Key Players
14	Project Loon	Communi-cation	2015	Helium balloons facilitate reliable and cost-effective beaming of internet service from the sky to places where towers are not feasible.	To expand educational and economic opportunities to 4.3 billion people who do not have access to internet	Google Facebook
15	Liquid Biopsy	Medicine	2015	Blood test for detection of cancer cells	To detect cancer cells that kills eight million people a year around the world	Dennis Lo, Chinese University of Hong Kong, Illumina, Bert Vogelstein, Johns Hopkins
16	Megascale Desalination	Others	2015	Seawater desalination process that can cost-effectively provide a substantial portion of a nation's water supply. *[e.g. Largest reverse osmosis desalination plant operates in Israel]*	To meet the fresh water needs of growing populations world over as supplies of are being depleted	IDE Technologies, Poseidon Water, Desalitech, Evoqua
17	Apple Pay	Others	2015	Faster and secure service, helped by a combination of technologies makes the use of smartphone work as a wallet for daily needs	To minimise credit card fraud that raises the costs of goods and services	Apple Visa MasterCard Google
18	Brain Organoids	Medicine	2015	Three-dimensional clusters of living neurons that can be grown in a lab from human stem cells	To help researchers understand new ways of testing brain disorders and find possible treatment methods	Madeline Lancaster and Jürgen Knoblich, Institute of Molecular Biotechnology, Rudolph Tanzi and Doo Yeon Kim, Massachusetts General Hospital

Sr. No.	*Technological Innovation*	*Subject*	*Year*	*Brief Description*	*Objective of Developing the Technology*	*Key Players*
19	Supercharged Photosynthesis	Others	2015	An advanced genetic tool to boost crop yields; Engineer rice plants to extract energy from sunlight far more efficiently	To increase crop yields since demand from a growing population is rising faster than supply	Paul Quick, International Rice Research Institute, Daniel Voytas, University of Minnesota, Julian Hibberd, University of Cambridge Susanne von Caemmerer, Australian National University
20	Internet of DNA	Medicine	2015	A global network of millions of genomes. Technical standards that let DNA databases communicate	To extend medical treatment from the experiences of millions of others	Global Alliance for Genomics and Health, Google, Personal Genome Project
21	Agricultural Drones	Robotics	2014	Easy-to-use agricultural drones are equipped with cameras costing less than US $1,000	To close monitor crops and improve water ussage and pest management	3D Robotics, Yamaha, Precision Hawk
22	Ultraprivate Smartphones	Communi-cation	2014	Smartphones with advanced security and privacy features that transmit minimal personal information via mobile phones	To help governments and advertisers gather personal details from cell phones	Blackphone, CryptoPhone, Open Whisper Systems

Sr. No.	Technological Innovation	Subject	Year	Brief Description	Objective of Developing the Technology	Key Players
23	Brain Mapping	Medicine	2014	A high-resolution map that shows detailed structures as small as 20 micrometers of the human brain	To help neuroscientists understand how the brain works and make a detailed map of its anatomy	Katrin Amunts, Jülich Research Centre, Alan Evans, Montreal Neurological Institute, Karl Deisseroth, Stanford University
24	Neuromorphic Chips	Computing	2014	An alternative design for computer chips that will enhance artificial intelligence	To overcome the current performance imitations of the traditional chips	Qualcomm, IBM, HRL Laboratories, Human Brain Project
25	Genome Editing	Genetics	2014	Use of a genome-tool capable of creating two monkeys with specific genetic mutations	To modify targeted genes in primates and study human diseases	Yunnan Key Laboratory, Jennifer Doudna, UC Berkeley, Feng Zhang, MIT, George Church, Harvard
26	Microscale 3-D Printing	Medicine	2014	3-D printing process that uses multiple materials to create objects such as biological tissues with blood vessels	To make biological materials with desired functions that could lead to artificial organs and novel cyborg parts	Jennifer Lewis, Harvard University, Michael McAlpine, Princeton University, Keith Martin, University of Cambridge
27	Mobile Collaboration	Communi-cation	2014	Productivity software service that makes it fruitful to create and edit documents on mobile devices	To speed up much of today's office work that is done outside an office	Quip, Quickoffice, Box, Dropbox, Microsoft, Google, CloudOn

Sr. No.	Technological Innovation	Subject	Year	Brief Description	Objective of Developing the Technology	Key Players
28	Oculus Rift	Communi-cation	2014	Leveraging VR technology for widespread use of high -quality virtual-reality hardware that is cheap enough for the consumer market	To provide visually immersive interfaces that will lead to new forms of entertainment and communication	Oculus Vry, Sonyk, Vuzix, Nvidia
29	Agile Robots	Robotics	2014	Legged machines that can stride over uneven or unsteady terrain	To make much of the inaccessible world to accessible to wheeled machines but not legged ones	Boston Dynamics, Schaft, Honda
30	Smart Wind and Solar Power	Computing	2014	Big data and AI are used for ultra-accurate forecast that enable much more energy to be integrated into power grid	To effectively deal with the intermittency of renewable energy as it is crucial for its expansion	Xcel Energy, GE Power, National Centre for Atmospheric Research
31	Smart Watches	Communi-cation	2013	Smartphone usable also as a watch	To enhance the ease of handling smartphones	Pebble
32	Ultra-efficient Solar Power	Energy	2013	Doubling the efficiency of solar device	To reduce cost of renewable energy production	Caltech
33	Memory Implants	Medicine	2013	Deciphering code by which brain retains long-term memories	To create long-term memories by implanting chips in the brain.	University of Southern California, Los Angeles
34	Prenatal DNA Sequencing	Genetics	2013	Reading the DNA of foetuses to know the genetic destiny of the unborn	To diagnose prenatal genetic diseases	Illumina, Verinata

Sr. No.	Technological Innovation	Subject	Year	Brief Description	Objective of Developing the Technology	Key Players
35	Deep Learning	Computing	2013	Machine that recognises objects and translates speech in real time	To enable advance computing	Google, Microsoft
36	Additive Manufacturing	Others	2013	A 3D printing technology that enables making of jet parts	To manufacture precision equipmnets and jet parts	GE
37	Big Data from Cheap Phones	Computing	2013	Collects and analyses data from phones to have insight into how individuals move, behave, contract and spread of diseases	To manage and eradicate epidemics like malaria	Harvard School of Public Health
38	Temporary Social Media	Communi-cation	2013	Self-destructing messages to enhance privacy and spontaneity of online communication	To ensure privacy in the use of social media	Snapchat
39	Supergrids	Energy	2013	High-power circuit breaker that makes it possible to generate DC power grid	DC grids would be more efficient at connecting far-flung sources of renewable energy, allowing utilities to average out local variations in wind and solar power and bringing power to areas with limited sunshine or wind supply	ABB

Sr. No.	Technological Innovation	Subject	Year	Brief Description	Objective of Developing the Technology	Key Players
40	Baxter: The Blue Collar Robot	Robotics	2013	Easy to interact robots	To handle industrial Jobs	Rethink Robotics
41	Egg Stem Cell	Medicine	2012	A recent discovery that increases older women's chances of having babies	To facilitate advanced age pregnancy	Harvard University
42	Ultra-Efficient Solar	Energy	2012	Under the right circumstances, solar cells from Semprius could produce power more cheaply than fossil fuels	To supplement the need for cheaper solar energy	Semprius, Siemens
43	Light-Field Photography	Others	2012	A camera that self-adjusts the focus of an image after a picture is taken	To provide options for making 3-D images at home	Lytro
44	Solar Microgrids	Energy	2012	Village-scale DC grids provide power for lighting and cell phones	To provide electricity to places not covered by conventional power grid	Mera Gao Power
45	3-D Transistors	Computing	2012	Intel creates faster and more energy-efficient processors	To provide efficient and faster energy processors	Intel
46	Faster Fourier Transformer	Communi-cation	2012	A mathematical upgrade facilitating speedier digital world – a boon to energy-conscious mobile multimedia devices such as smart phones	To reduce the power a computer requires to process a given amount of information	MIT

Sr. No.	Technological Innovation	Subject	Year	Brief Description	Objective of Developing the Technology	Key Players
47	Nanopore Sequencing	Genetics	2012	Simple and direct analysis of DNA that makes genetic testing routine and easily available	To enable routine and large-scale use of genetic testing for personalised medicines	Oxford Nanopore
48	Crowdfunding	Others	2012	Kick-starter is funding the commercialisation of new technologies	To enable quicker and cheaper financing of technology start-ups	Kickstarter
49	High-Speed Materials Discovery	Energy	2012	A new way to identify battery materials suitable for mass production and revolutionize energy storage	To enable more energy storage in batteries having applications for electric car to mobile phones	Wildcat Discovery Technologies
50	Facebook's Timeline	Communi-cation	2012	A social-networking company that collects and analyzes consumer data on an unprecedented scale	To better target communication (Advertising)	Facebook

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Annexure 2

Technological Innovations in Connected Devices

The following are some of the important devices used to access internet: personal computers, desktops, laptops, basic mobile phones, smartphones, tablets, smart watches and Enterprise Digital Assistant (EDA). These devices fall under two categories: (i) stationary and (ii) mobile. There are tremendous developments in the areas of storage, computing, display, graphics, size and portability, operating procedures and application softwares as well as inter-compatibility of these devices. These advances in hardware and software of connected devices have lead to marked decrease in their cost. Innovations in both stationary as well as mobile-connected devices have enhanced their functionality, ease of handling and have made them more user-friendly whereby even a computer illiterate person can use them.

Table 1 below shows that the devices used to access and use internet have changed since 1989 when the World Wide Web (www) was launched. Technological innovations can only be appreciated when one has used all these or related devices. Switching from using a Macintosh or IBM PC 300 (stationary device) to Lava Iris Atom X smartphone (mobile) for accessing the internet is a quantum leap indeed – like an experience of having practically lived through various eras in one's life-time. The profiles of persons handling such devices at the respective points of time have also undergone a sea change that is easily noticeable in society. The former would have been used by a top executive of a multinational firm then, while the latter is being used by a vegetable vendor or an auto-rickshaw driver of today.

Table 1: Devices Used in Different Eras to Access Internet – Fixed Cost of Accessing Internet

Year	Product/Event	Indicative Device of corresponding time	Cost of Device	Fixed cost of accessing Internet (Rs.)	Dollar / Rupee	Consumer Price Index	Inflation-adjusted price in Rs. of device (base : 2016)
1989	World Wide Web	Macintosh SE/30	US$ 6500	108220	16.6492	31.89	501089
1993	Mossaic	Power Exec 4/25SL laptop computer	US$ 2999	94068	31.3655	30.97	448502
1995	e-commerce and mobile phones launched in India	IBM PC 300 desktop systems	US$ 2000	66900	33.4498	37.62	262584

Year	***Product/Event***	***Indicative Device of corresponding time***	***Cost of Device***	***Fixed cost of accessing Internet (Rs.)***	***Dollar / Rupee***	***Consumer Price Index***	***Inflation-adjusted price in Rs. of device (base : 2016)***
1997	Mobile internet	Nokia 9000 Communicator	US$ 800	29732	37.1648	43.94	99914
2008	Android based smartphones	T-Mobile's G1 Android phone	US$ 179	8219	45.917	80.53	15071
2016	Present	Lava Iris Atom X (Rs. 2399)	US$ 36	2399	67.84	147.66	2399

Source: *Data accessed from various websites via internet*

The main impact of technological innovations in connected devices has been translated into massive decrease in prices of these devices. From the Table1 we can see that the prices have fallen at an astronomical rate of 99.52% (in inflation adjusted term) in just 27 years. This has helped in the spread of ownership of these devices for accessing and using internet services even by large sections of the population. In fact every Tom, Dick and Harry now owns and uses what used to be the exclusive 'toys' of only the rich and famous who only could afford to own and proudly flash such devices around in 1989.

Another important innovation in connected devices has been the use of open-source operating system in mobile devices. The use of Android as one of the operating systems has helped smartphones to become one of the major sources of connected devices to the internet. This has made internet available anytime anywhere. Commercially this open source "Android" has led to revolutionising the "application software" or apps for using internet. This together with massive proliferation of connected devices has given a huge fillip to e-commerce and social media.

Connecting Technology: The access and usage of Internet is provided by the Internet Service Provider (ISP) by employing a range of technologies to connect users to their networks. Available technologies have ranged from computer modems with acoustic couplers to telephone lines, to television cable (CATV), wireless Ethernet (Wi-Fi), and fibre optics.3 The communication technology used by ISPs in the early days of World Wide Web (www) was mainly through the landline connections, which then included cable, fibre optics, but now it predominantly has wireless access including cellular and satellite Internet access. Even the wireless access mainly uses cellular communication technology including Second/Third/ Fourth Generation (2G, 3G, and 4G). The use of cellular communication technology for accessing and using internet has greatly

enhanced the scope of internet for various activities at home, when travelling, at office, on vacation, anytime and anywhere.

The variable costs associated with the usage of internet mainly depend on the quantun of data usage and speed of the connection. From Table 2 below it is evident that internet access and usage charges have undergone drastic downward revisions from around Rs. 250/- per Gigabyte (GB) in 2007 to less than Re. 1/- per GB in 2016 for a fixed line broadband. Similar reduction is seen in mobile internet charge from around Rs. 286/- per GB (without video calling) in 2010 to Rs. 50/- per GB (including video facility) in 2016.

Table 2 : Indicative Rate of Internet Access and Usage Charges in India[4]

Year/ Scheme	*BSNL*	*Airtel*	*Tata DoCoMo*	*Reliance Jio (Launched in 2016)*
2007 (Fixed line Broadband)	Rs. 250 for 1 GB, thereafter Rs. 0.90 /MB (Home 250 - Broadband – Fixed line)	NA	NA	NA
2010 (Mobile Internet)**	Rs. 28 for 1 GB thereafter Rs.1 p/10 kb, 3G Tariff Bangalore/ Karnataka (26.01.2010)	Rs. 37 for 1 GB thereafter Rs.30 p/20 kb. (3G Tariff Bangalore/Karnataka 26.01.2010)	Rs. 376 for 1 GB thereafter Rs.1 p/1 kb. (3G Tariff Bangalore /Karnataka (26.01.2010)	NA
2016 (Landline or Mobile Internet)	Rs. 1 per GB (Rs. 249 for 300 GB data for fixed line broadband))	Rs. 277 per GB for 3G/4G		Rs. 50/- per GB

**Video calling extra charges at Rs. 1 per minute for BSNL and Rs. 3 per minute for Airtel and Tata DoCoMo in 2010. But this extra is not there since 2016.

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