

Big Data

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Big Data: A Game Changer for Insurance Industry

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Preface

Insurance has always been a game of numbers. Keeping track of risks means knowing the numbers – the data. Increasingly sophisticated techniques were added over time to better calculate the odds. Three and a half centuries ago, ‘knowing the numbers’ was maturing into the mathematics of risk – actuarial science – one of the foundations of modern data analysis. It was only in the late 1960s and 1970s, more powerful machines and better software were coming into play. Online systems allowed workers to share information freely and conduct inquiries in real time. Investment in technology increased steadily. The insurance industry was on top of information technology (IT) trends in 1980, and the arrival of the Internet in the 1990s helped insurance data science. As a consequence, the amount of customer data being gathered and exchanged exploded. At the same time, the costs of data processing and storage were dropping rapidly. In lieu of the mass modelling of the past, insurers were gaining the capabilities (and the technical tools) to calculate risk on an individual level. The era of big data was just around the corner.

Big data is a relatively recent development in insurance industry because the size of the data sets previously made it impossible to analyse with traditional methods. But with advancements in artificial intelligence and machine learning, big data can be stored efficiently and analysed computationally. For insurance purposes, big data refers to unstructured and/or structured data being used to influence underwriting, rating, pricing, forms, marketing, and claims handling and incentivise risk reduction. With the global capacity to collect and store data growing and with the advancements in artificial intelligence (AI) and machine learning technology, insurers need to seriously evaluate their technology stacks to ensure they can remain competitive and respond to growing customer demand.

Insurers are sitting on a pile of data, but they are not able to use it to the maximum capacity. The reason is that not all data are digitised. Further, data that have been digitised is spread across different systems within the insurance companies, which may not be integrated. Lack of credible third-party data is also an issue. Several insurers have started implementing big data approach but only for their marketing campaigns. There is scope for efficient decisions based on big data not just in customer-facing functions like sales or claims servicing but across the insurance continuum like in areas of product development, pricing, risk assessment, fraud, and management. Where it was once difficult to gather data about potential risks, today’s insurers have lots of data to work with, for example, telematics devices, smartphones, social media, CCTV footage, electoral

rolls, credit reports, website analytics, government statistics, and satellite data. Insurance aims to improve customer satisfaction, and it is employing big data to accomplish that. The more an insurer knows about its customers, the easier it is to keep them happy – and paying premiums.

The primary goal and main objective of this book is to provide good knowledge of big data concepts and their applications particularly in the field of life and non-life insurance. *Big Data and Analytics for Insurers* is the industry-specific guide to creating operational effectiveness, managing risk, improving financials, and retaining customers. In the advent of big data and analytics, this book fills the void with concrete information on using big data in the context of day-to-day insurance operations and strategy. This book fills a critical need in setting forth the role of modern risk analysis in managing catastrophe risk: storms, hurricanes, tornadoes, geomagnetic events, terrorism risk, earthquakes, floods, and COVID-19. There is no comparable reference work for this important subject area. It strikes a good balance between the technical aspects of the subject and the practical aspects of decision-making. From fraud analytics in claims management, to customer analytics, to risk analytics in solvency, comprehensive coverage presented makes this book an invaluable resource for any insurance professional.

The Editors

Foreword

Over the years, the insurance industry has diversified to meet the challenging and dynamic needs of the insured. Big data analytics plays vital role in transforming the insurance industry to the next level. Big data generated via telematics, smart phones, social media, credit reports, and web analytics is the key to exploiting and enhancing the current practices of the insurance industry. Thus, many established and new insurance companies have invested heavily in the automation of their insurance products.

In this book, the conceptual framework is defined for using big data for business intelligence in the insurance industry. The factors affecting the practices and standardization, and regulatory initiatives are discussed. The focus on using data science in formulating insurance product pricing, its optimization, claim prediction, and fraud detection is described. The role of big data in the growth of sustainable economics with a legal framework for trusted third parties, ethics, and government compliance are discussed. Later, the book focuses on the potential constraints of big data, its driving force, and the implementation of cyber security law for the insurance industry. Finally, the Digital Operational Resilience Act (DORA) for insurance, its legal framework, related business model, and distribution channel are provided.

Big Data: A Game Changer for Insurance Industry is indeed a commendable work by authors. The book covers all the aspects of the insurance industry and highlights valuable insights on why extracting and analyzing Big Data is essential for current practices and future trends.

I wish the readers great learning ahead!



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Chapter 1

Use of Wearable and Health Applications in Insurance Industry Using Internet of Things and Big Data

Pallavi Seth and Kamal Gulati

Abstract

Introduction: There is a variety of wearables and health applications available in the market which allow the tracking of various health and lifestyle measures like blood sugar, calorie counter, number of steps, sleep patterns, etc. After the Covid-19 pandemic, people have become more aware of their health and use these wearables to maintain a healthy lifestyle. Insurance companies in India are also eyeing the potential usage of these wearables in life and health insurance.

Purpose: This research aims to look at the emergence of wearables and health apps and their usage in India's life and health insurance industry. This study also focuses on how these devices might benefit insurers' business models and some of the pitfalls to consider.

Methodology: The study used both primary and secondary data. A survey was conducted to understand the customer perception towards usage of wearables. The secondary research included the analysis of the integration of wearables by insurance companies.

Findings: The research would be helpful to the insurance companies as it would help them to understand the customer's viewpoint for the usage of wearables in the insurance industry. This study would also allow insurers to understand new dimensions, such as where the wearables improve customer satisfaction and engagement. The study results would be helpful for the customers for the appropriate usage of wearables and the internet of things (IoT). Insurance companies can provide better pricing and make personalised insurance plans that ultimately help customers.

Keywords: Wearables; internet of things; technology; insurance industry; health applications; big data

JEL Classification Code: G22

I. Introduction

With the Dotcom bubble burst in 2000, our lives and societies got transformed by technology. Less than 7% of the world was online in the year 2000, and currently, over half of the population has access to the internet.¹ Cell phone users have also increased from 740 million in 2000 to more than 8 billion in 2021. Technology has changed the way businesses are carried out in the last 20 years, and Covid-19 has made technology an integral part of any business.

Insurance Regulatory and Development Authority of India (IRDAI) introduced sandbox regulations in the year 2019 (Business Standard, 2020; Satuluri, & Radhika, 2021). These regulations invite the insurance companies to develop innovative ideas that would help develop the insurance sector. The insurance companies and insurtech firms took this well. Also, Covid-19 has given a digital push to the insurance industry to take this digital revolution forward. The complete sales process has become entirely digital. This makes it possible to improve client reach, cost-effectiveness, and service. The customers, who want the finest in terms of technical innovation, are ecstatic about the progress in digital transformation. We're also returning to risk-based pricing with big data and analytics, which is appropriate to the risk shared by the consumer. Because wearables are still in their infancy, the usage of wearables is still growing in life insurance. Newer technologies, such as artificial intelligence (AI) and machine learning, allow businesses to achieve greater cross-growth and upsell growth. This will undoubtedly have a significant and long-term favourable influence on most insurance firms' bottom lines, resulting in increased profitability.

In India, the insurance industry follows a standard business model that incorporates risk pricing, large capital requirements, and customer retention measures. The incumbents in the industry have been reticent to change or adjust their business models, giving insurtech start-ups a window of opportunity. As a result, the number of insurtech start-ups that are always concentrating on integrating technology has increased. FinTech has been affected mainly by new technological tools such as big data analytics, machine learning, and blockchain since the emergence of technology in the finance sector (FinTech). The insurance industry holds a similar amount of potential. Insurtech businesses have focused on technology to access new channels, consumer categories, and innovative service delivery. They are also attempting to tailor insurance policies by analysing consumer behaviour, lifestyles, and specific patterns in calculating consumers' rates (Rajani, 2019).

Enormous data sets are generated with the recent boom in wearable technologies, which are the ideal starting point for new service offers by big data analytics.

¹<https://www.bondcap.com/report/itr19/1>

In a Pay-As-You-Live (PAYL) service, the activities of insured persons are tracked like the number of steps taken in a day, etc. The current lifestyle data are shared with the insurers, and in return, the insured receive rewards from their insurance companies (Wiegard & Breitner, 2019).

II. What are Wearables?

Eyeglasses, invented in the 13th century, were the first wearable technology. It was revolutionary when it was first introduced. Since then, wearable technology has advanced rapidly. The Nuremberg Eggs were a similar invention from the sixteenth century. The Nuremberg Eggs were widely used until wristwatches came into fashion. The 'Abacus rings' were invented in the 17th century and later replaced by calculators. Several notable wearables emerged over the next few decades, including TV glasses, the Pulsar Calculator Watch, and the Sony Walkman.

Wearable technology is now in a different league. Today's wearables redefine health care. Beyond personal health, wearables are revolutionising healthcare and insurance. Wearables and insurance are creating a lot of buzz in the tech world. The wearables market in India has grown over 170.3% in January–March 2021, as per the report from International Data Corporation (IDC).²

Smart wearables help real-time and remote health data monitoring for effective diagnostic and preventive healthcare services. Wearable devices can track and monitor healthcare vitals such as heart rate, physical activities, body mass index (BMI), and blood pressure and notify individuals about their health status. AI-enabled wearables show an ability to transform the health insurance sector. This would enable self-management of individual health and help them shift focus from treatments to prevent health hazards. This customer-centric approach to healthcare will allow the insurance companies to track the health behaviour of the individuals (Shah, Ahirrao, Phansalkar, & Kotecha, 2020).

Wearables are body-attached computers, such as fitness wristbands, intelligent glasses, or even smart clothes. Manufacturers, service providers, and insurance companies are interested in the data collected by wearables. With the help of wearables, personalisation such as providing customised insurance products and health services can be provided (Soliño-Fernandez, Ding, Bayro-Kaiser, & Ding, 2019).

The internet of things (IoT) is popular among all sectors and industries. Through the IoT, unique identifiers are provided to objects, animals, or people, and it can transfer data without requiring human-to-human or human-to-computer interaction.

²<https://www.thehindubusinessline.com/info-tech/other-gadgets/india-wearables-market-witness-170-yoy-growth-in-q1-2021/article34658443.ece>

III. IoT and Wearable Devices

IoT refers to a network or system of internet-connected devices transmitting, collecting, and sharing data. It has been described as ‘the network of physical objects – things – that are embedded with sensors, software, and other technologies to connect and exchange data with other devices and systems over the Internet’. IoT technologies are synonymous with products such as ‘smart homes’, connected vehicles, and wearable devices. The January 2019 McKinsey & Co. report ‘Digital Ecosystems for Insurers: Opportunities through the Internet of Things’ reported that in 2015, each person had approximately three sharing devices, totalling 25 billion devices, and estimated that by 2025 that number would increase to six devices per person – totalling over 50 billion devices in use worldwide.

IoT and its various applications have significant insurance ramifications, as it allows the use of sensors to monitor an insured risk, transforming rough data into usable and quickly processed information. Insurers can use these data to assess risk better and tailor their business approaches accordingly. IoT has and will continue to increase precision in evaluating risks and pricing insurance policies. The use of IoT assists in loss mitigation and prevention through behaviour modification. For example, auto sensors can provide warning signs for actions that lead to accidents. Insurers even used sensors during Superstorm Sandy in 2012 to aid them in tracking the storm’s impact.

IoT applications can also give more significant levels of granularity in risk modelling to improve underwriting and personalised insurance products and services. Insurers can use IoT to reduce costs and generate additional revenue by monetising data insights from telematics of behaviours. In addition to providing more significant customer interaction and cross-selling through telematics applications, IoT to trigger maintenance will improve prevention mechanisms.

For example, auto insurers have introduced usage-based or demand-adjusted pricing achieved by monitoring IoT sensors. IoT will improve safety standards, as ambulatory services will be dispatched immediately after an accident. The use of sensors in driving analytics will even enable fraud recognition.

Another application of IoT is the wearable device, which has been called ‘the human body’s black box’. With the availability of wearable devices such as Fitbit® and Apple Watch®, health and life insurance companies can likewise track health data for the insured. Fitbit® reportedly sold over 60 million devices from 2007 to 2017, and today, it is estimated that one in five internet users wears a device. Wearable devices can be used to supplement or even replace medical examinations used in the underwriting process, reducing insurers’ costs and improving data quality. Insurers can collect and analyse more data more quickly than ever before through IoT, enabling them to analyse risk better more efficiently – a benefit for insurers and insured alike.

IV. Integration of Wearables and Insurance

Some insurers currently employ wearables to support general fitness as part of their value chain. The next generation of wearables will be equipped with

medical-grade technology, allowing for individualised health advice, goals, and interventions (Swiss Re Institute, 2017).

Wearables are small personal minicomputers that record biometric and medical information. The insurance industry hopes to receive new sales possibilities of new products using this information. The insurance business can benefit from the usage of big data in the future in various ways (Becher, 2016).

Some of the wearables available in the market are (Future Generali Total Insurance Solutions, 2021):

1. **Apple Watch:** One of the most popular smart devices is the Apple watch, with an impressive piece of technology. Through it, the heart rate, workout monitoring, and the level of activeness per day can be measured.
2. **Fitbit trackers:** Fitbit has many versions available in the market – Blaze, Alta HR, and Charge 2. It has gained an outstanding response in the Indian market. The latest versions – the bands are in the form of a watch-style strap, which is easy to wear, and are equipped with a heart rate monitor.
3. **Jawbone band:** The latest offering by Jawbone is UP2. A dedicated app syncs all the information once the band is plugged into the phone's headphone jack.
4. **Google Fit app:** Global positioning system (GPS) and other sensors and inputs from the phone are used in the Google Fit app to track the activities. It is a free app and very resourceful and provides many options to track your primary and other health stats.
5. **Moov Now tracker:** Although the Moov Now tracker is not equipped with a heart rate monitor, it is a good option for beginners, and it is also waterproof.
6. **Mi band:** The Mi band comes with many features and is quite economical. It can count calories, measure distance walked, and measure sleep patterns.
7. **GOQii band:** A unique option is a GOQii band with an actual human trainer. The user can talk to the trainer through the application. It also monitors the number of steps and activity levels. But the data have to be fed manually into the band like food intake, exercise, etc.
8. **Nike Running app:** An app is a good option for people geared towards running. It offers a personalised running plan, heat map, and customised soundtracks.
9. **Runtastic app:** This app started with a focus on athletes, and now it targets all sportspersons, both amateurs and professionals. Running, cycling, or jogging activities are measured through this app.
10. **Healthify Me app:** This app is very popular as it includes the Indian diet using its database of more than 20,000 food items consumed across 13 regions in India. Reputable nutritionists, fitness trainers, and yoga instructors are available, and one can also choose a health plan.

Benefits of wearables and health apps:

1. **Self-awareness about health:** Self-awareness about health is increased as wearable device helps to track daily activities such as eating, walking, sleeping, exercising, etc.

2. **Appropriate health management tool:** Using these wearables, people can understand if these workouts align with the health goals.
3. **Keeping obesity under control:** Obesity is a global problem, which can also be managed through these wearable devices. As one can understand the requirement of calorie intake and exercise or other activities, it can help in controlling obesity and maintaining the right BMI.
4. **Act as a motivator to keep health on track:** Wearables can act as great motivators as the user can set alerts and accordingly get reminders. It helps to keep the user on track.
5. **Your trusted health consultant:** Medical tips, advice from doctors and dieticians can be sought based on the data fed on the device.

As wearables and health applications have many benefits, IRDAI had also issued a circular in 2017 encouraging insurance companies to use wearable devices to measure personal fitness, incorporating a healthy lifestyle in the policyholders. Many insurance companies have included the usage of wearables and health apps in their health insurance plans. The next section explains the use of wearables and health apps by insurance companies.

V. Use of Wearables in Insurance

As healthcare costs have skyrocketed, it becomes essential to purchase health insurance plans, but it is equally important to invest in wellness and preventive healthcare to remain fit. Seeing the importance of preventative healthcare and a healthy lifestyle, many insurers have started using wearable in their health insurance plans.

1. For engaging customers:

Health insurance companies use health apps and wearables to engage with customers. Many companies, such as Cholamandalam MS General Insurance Company Ltd, use mobile applications for their health insurance customers. In addition to providing information related to the policy benefits and access to network hospitals, it also has the pedometer, BMI calculator, and blood sugar tracker, which are helpful in engaging customers.

Max Bupa Health Insurance Company has also launched a plan, Go Active. The company has tied up with premier health and technology companies like GOQii, Practo, and Img exclusively to design this mobile application, with the intent to empower Go Active customers to seamlessly manage their health anytime, anywhere with a single touch. With the help of this application, customers can book their consultation and lab tests online at home. They can also have annual health checks and behavioural counselling sessions.

The Max Bupa Health Coach mobile app (made for Go Active users) integrates clients' fitness data and health scores in real time. Customers' Google Fit/Apple Health accounts can be linked to track their fitness. This app also includes blogs and articles relevant to health and fitness.

Table 1. Insurance Companies Using Wearables and Health Apps for Customer Engagement.

Insurer	Wearable/App	Benefit
Cholamandalam MS General Insurance Company Ltd	Mobile application	Policy benefits, network hospitals, pedometer, BMI calculator, blood sugar tracker
Max Bupa – Go Active	GOQii, Practo, and 1mg	Book their consultation and lab tests online at home. Annual health checks and behavioural counselling sessions. Monitor health real time
Bharti AXA General Insurance Company Ltd	Wellness Cuppa portal	Video/teleconsultation, pharmacy, diagnostic services, online chat with doctors, doctor’s appointment, doctor on call, and medical second opinion

Source: Authors own work.

Bharti AXA General Insurance Company launched Bharti AXA Wellness Cuppa portal under its plan Health Advantage. Through this app, the policyholders can avail themselves of the entire gamut of wellness features and services in one place. Aside from health benefits, video/teleconsultation, pharmacy, and diagnostic services, online chat with doctors, doctor’s appointments, doctor on call, and medical second opinion are some features.

2. Rewarding healthy behaviours

Some insurers use external motivators such as rewards, monetary discounts, and digital badges to incentivise customers to lead a healthier lifestyle (Paluch & Tuzovic, 2017; Campbell & Re Gen., 2014). The health insurance plan of Aditya Birla capital – Activ Assure Diamond plan – provides a discount in renewal premium up to 30% on the basis of healthy heart score and active days.

Bajaj Allianz General Insurance Company launched BAGIC GOQii Co-pay Option under the Regulatory Sandbox approval received from IRDAI. The co-pay option would be an add-on cover for the health insurance policy – Health Ensure (Press Release, 2021). This add-on cover rewards customers for adopting a healthy life cycle by giving deduction in the copayment. Through the GOQii app, customer engagement would be tracked and dispatch the health band. The policy starts with a co-pay of 50%. The co-pay percent will change as per the engagement level. As the engagement level increases, the co-pay percentage will go down and vice versa with the maximum co-pay of 50%.

The health Suraksha plan provided by HDFC ERGO insurance company offers a discount in insurance renewal premium based on number of steps per week or calories burned per week.

Bharti AXA General Insurance Company launched a health insurance product – Health AdvantEDGE plan. The policyholder gets rewarded for adopting healthy habits. These reward points can be redeemed to avail a discount on the policy premium or a concession on medical bills or consultation fees, among others.³

Manipal Cigna Health Insurance also provides rewards in its plan – Get Pro-activ. Reward points are earned based on the quantum of physical activity. The company uses these reward points to give discounts on renewal premium, up to the maximum limit of 10% annual premium.⁴

Policybazaar Insurance Web Aggregator Pvt. Ltd, jointly with Go Digit Gen Insurance Co. Ltd, has proposed a wearables health insurance plan in IRDAI Regulatory Sandbox.⁵

ICICI Lombard also provides health wellness benefits and rewards policyholders for their healthy behaviour through various wellness services.

Liberty Videocon General Insurance Company also provides a wellness and assistance programme on an optional basis in its health insurance plan.

Magma HDI is also providing fitness rewards and wellness services as additional features. Doctor on call, nutritionist e-consultation, etc. are available.

3. Wellness Programmes

Reliance General Insurance Company has launched a wellness programme through R-card. This card is not just for claims but also provides discounts and deals on various health and lifestyle products and services like Apollo Pharmacy, Lal Path Labs, etc.

Universal Sampo also provides wellness programmes through its mobile application. The insured person can avail discounts on outpatient consultation, pharmaceuticals, and diagnostics tests through the empanelled network providers.

To perform various healthcare activities such as Health Risk Assessment, the insured person has access to a web-based Health portal on the Company's website or a Wellness mobile application (HRA). This tool provides a statistical estimate of an insured's overall health risk status and lifestyle. Medical test results, prescriptions and other consultation papers can be stored in the personalised portal, which is digitised to create a complete health profile. The results of medical tests and HRA provide a health score for the insured. Screening: The insured is classified as Healthy based on their health score, and no medical screening is required. If the score is unhealthy, the insured is advised to get medical screening and set a "Health Goal" to improve their overall health. The insured person will be assigned a dedicated Health Coach who will look after their entire wellbeing (s).

³<https://www.financialexpress.com/money/insurance/bharti-axa-general-introduces-health-advantedge-with-wellness-and-ayush-benefits-check-details/2190886/>

⁴<https://www.livemint.com/money/personal-finance/from-claims-to-medical-advice-to-health-checks-insurance-gets-tech-savvy-1564487821576.html>

⁵https://www.irdai.gov.in/ADMINCMS/cms/frmGeneral_Layout.aspx?page=PageNo4142&flag=1