

A Work Project, presented as part of the requirements for the Award of a Master's degree
in Management from the Nova School of Business and Economics.

IMPACT ANALYSIS OF NEW TECHNOLOGIES ON BUSINESS MODEL
IN THE INSURANCE INDUSTRY - ARTIFICIAL INTELLIGENCE

OLIWIA ANNA KAZNOWSKA

52654

Work project carried out under the supervision of:

João Castro

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Abstract

The rapid emergence of new technologies has significantly influenced the insurance industry, driving transformation and innovation in business models. This work project investigates the impact of technologies, such as smart devices and artificial intelligence (AI), on developing insurance offerings and customer experiences. The analysis of the business model canvas reveals that integrating advanced technologies enables insurers to deliver more personalized, flexible, and cost-effective solutions, resulting in improved customer satisfaction and retention. Moreover, the study identifies the importance of data-driven decision-making and proactive risk management as crucial factors in driving the success of new business models in the insurance industry.

Keywords

new technologies, insurance industry, business model,
artificial intelligence, smart devices,
IoT, digital transformation

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1. Introduction

The development of new technologies has initialized a transformation across various sectors. It is important to be aware of their impact on businesses and how they influence and reshape various industries, from finance and retail to healthcare and agriculture. The rapid pace of technological innovation, including AI, machine learning, big data, and IoT, presents a unique opportunity to explore how industries adapt to change and leverage these technologies to enhance customer experiences, improve operational efficiency, and drive growth.

New technologies are particularly interesting in the insurance industry due to several factors that make this sector ripe for innovation and transformation. First, the insurance industry relies heavily on complex decision-making processes for underwriting, risk assessment, and claims management. New technologies like AI and machine learning can greatly enhance these processes by automating tasks, analyzing vast amounts of data, and providing accurate, data-driven insights. The insurance industry's complex nature, data-driven decision-making, evolving customer expectations, and need for innovation make adopting new technologies especially interesting and valuable. These technologies have the potential to significantly transform the industry, leading to more personalized, efficient, and customer-centric services. This leads to the research question of how new technologies impact the business model in the insurance industry? By investigating the impact of smart devices, including wearables, IoT-enabled sensors, and telematics, this paper will assess how data-driven insights enable insurers to offer personalized products, enhance risk management, and foster a proactive approach to loss prevention.

Furthermore, it will analyze the role of artificial intelligence in automating complex tasks, streamlining operations, and improving decision-making across various functions. This research will provide a comprehensive analysis of the current state of technology adoption within the insurance industry, identifying key trends, challenges, and opportunities that will

shape this vital sector's future in the digital transformation era. Finally, based on the existing literature and the research question, this study aims to investigate the hypothesis stating that new technologies alter the business model of insurance companies.

The structure of the work paper is organized as follows: following the introduction part, there is a literature review examining the insurance industry and business model canvas concept in this sector. Afterward, the methodology employed for data collection and analysis relevant to the research question is detailed. The subsequent section presents the introduction to new technologies and is followed by the description and analysis of smart devices and artificial intelligence (AI). Both technologies are described and analyzed in terms of their impact on business model in the insurance industry. Lastly, the paper is concluded by summarizing the main findings, discussing their implications, and proposing potential directions for future research.

2. Literature review

2.1. An overview of the Insurance Industry: Key Concepts and Dynamics

The insurance industry is a complex sector that provides individuals, businesses, and organizations with financial protection against potential risks and losses. Insurance is *the exchange of an uncertain loss of unknown magnitude for a small and known loss (the premium)*. (Zweifel, Eisen, and Eckles 2021) Its fundamental role is managing risk. Insurers offer various policies such as home insurance, life insurance, health insurance, auto insurance, and many more to protect against unpredictable events, such as accidents, illnesses, and natural disasters. Companies use various techniques to assess and manage risks, including actuarial science, risk pooling, and diversification.

The traditional business model of an insurance company revolves around assessing and managing risks to provide financial protection to individuals and businesses. Insurance providers collect premiums from policyholders and pool these funds together to cover potential

losses. They rely on skilled underwriters who use actuarial science, historical data, and risk analysis to determine the likelihood of various events occurring and calculate the appropriate premium rates. When a policyholder experiences a covered loss, the insurance company pays a claim according to the policy's terms. The goal of an insurance company is to maintain a delicate balance between premiums collected and claims paid while investing surplus funds to generate additional revenue. This business model requires a substantial focus on managing administrative costs, handling claims efficiently, and maintaining customer satisfaction to ensure long-term profitability and growth.

The fact that the insurance industry faced various challenges in 2021 due to the COVID-19 pandemic has made the sector adapt to the new reality of remote working and digital customer engagement while managing increased claims and financial risks. Despite these challenges, the global insurance market remained stable and generated revenues. Moreover, the pandemic and technological advancements have accelerated the emergence of innovative business models within the insurance industry. As the world becomes more interconnected and digital, consumers seek personalized, flexible, and convenient insurance products that align with their evolving needs and lifestyles. With these emerging business models reshaping the insurance landscape, it is important to understand the market dynamics, trends, and the potential impact of these innovations. The market size in 2021 was estimated at over \$6 trillion, with the non-life insurance segment being the industry's largest component, accounting for over half of the global market. The pandemic created new opportunities for insurers in some areas, such as health insurance, where policy demand increased due to concerns about COVID-19. However, it also caused disruptions in other industry segments, such as travel insurance, which experienced a significant decline in demand. Technology played a crucial role in the insurance industry in 2021, as insurers increasingly relied on digital platforms and tools to offer their products and services to customers. Insurtech, a portmanteau of "insurance" and "technology",

represents the wave of digital innovation that's disrupting the traditionally conservative insurance industry. The rise of insurtechs has been driven by a combination of factors including advancements in technology, changing customer expectations, and the desire for more efficient and personalized insurance services. Insurtech companies continued to disrupt the traditional insurance market, introducing new business models and innovative solutions, increasingly adopting technologies like artificial intelligence, the internet of things, machine learning, and data analytics. (Statista 2022) Insurtechs are capitalizing on the inefficiencies of traditional insurance companies as, by leveraging technology, they can automate and streamline processes, reducing overhead costs and enabling more competitive pricing.

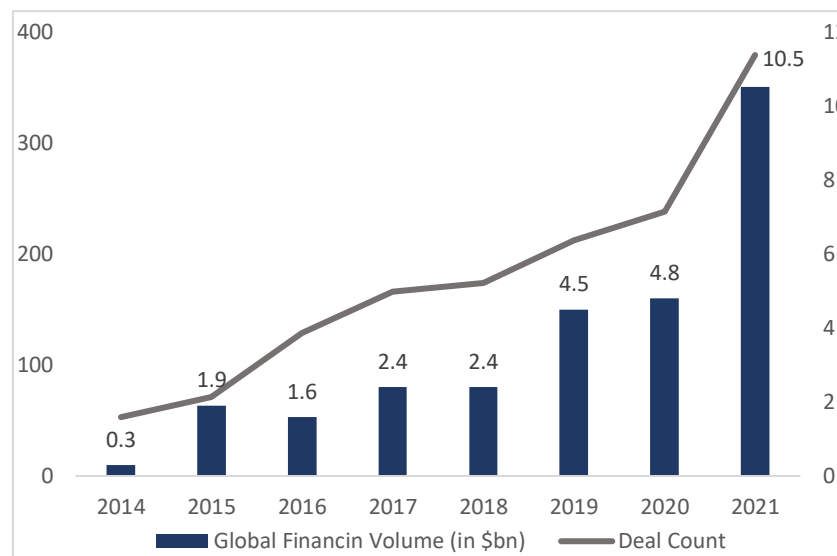


Figure 1. 2014-2021 Insurtech financing activity (Ostertag et al. 2022)

The financing activity of insurtechs has seen a significant upswing between 2014 and 2021, indicating a surge in investor interest and confidence in this sector. In 2014, insurtechs secured 53 deals, amounting to a total of \$0.3 billion. However, by 2021, the number of deals skyrocketed to 379, and the total financing increased dramatically to \$10.5 billion. This represents a roughly 7-fold increase in the number of deals and a more than 30-fold increase in funding over this period. (Figure. 1)

Another trend that is transforming the insurance industry is open insurance, which is a modern business approach. It refers to sharing data and services through open APIs and other interfaces across different organizations and industries to create new value propositions, generate revenue streams, and deepen customer relationships thanks to more personalized and innovative insurance products and services. Overall, open insurance is a significant trend reshaping the insurance industry and offers new opportunities for innovation and growth. By embracing this approach, insurers can become more customer-centric, agile, and efficient and better position themselves to succeed in a rapidly changing market. (Gasc 2020)

The insurance industry is expected to continue to grow, driven by the increasing adoption of digital technologies and the expansion of emerging markets. However, the sector also faces significant challenges related to changing customer needs and expectations, evolving regulatory environments, and new risks associated with global trends. (Statista 2022)

2.2. Insurance Industry Business Model Canvas: A Strategic Framework

The term “Business model” is commonly used while analyzing how a company is operating. One of the first definitions provided was formed by Timmers in 1998. He stated that Business Model is an architecture for the product, service, and information flows, including a description of the various business actors and their roles, A description of the potential benefits for the various business actors, and a description of the sources of revenue. However, Timers pointed out that a business model definition alone is not sufficient to describe a company's and external actors' aims (W. Wirtz 2020). In the next years, the definition evolved as more authors introduced their models and explanations (ex. Business model definition by Wirtz (2000), Business model approach by Hedman and Kalling (2002)). Nowadays, one of the most popular models used in creating business model is Business Model Canvas by Alexander Osterwalder and Yves Pigneur. They define a business model as the rationale of how an organization

creates, delivers, and capture value. The BMC model consists of 9 building blocks describing how the company plans to generate cashflows. (Osterwalder and Pigneur 2010)

The business model canvas is a universal tool that can be used in a vast spectrum of market segments. It is crucial to note that every building block will vary significantly between different industries. Yet, it is likely that within the given industry, BCM for each organization will be quite similar. Therefore, to analyze the impact of new technologies (AI and smart devices) on the BCM in the insurance industry, it is crucial to explore how each building block of the BCM model is designed.

Customer segments

In the insurance industry, segmentation is a necessary process that involves various criteria and attributes. This industry's most significant segmentation types are value-based, socio-demographic, and behavioral patterns. Value-based segmentation groups customers based on their revenue or profitability, making it an essential tool for identifying the most valuable customers and tracking changes in their value over time. It also helps develop differentiated service delivery strategies and optimize marketing resource allocation. Socio-demographic segmentation uses information such as age, income, and education to identify different customer groups. Behavioral segmentation involves analyzing customer behavior patterns using data from the organization's data warehouse or data marts, and the segments are identified using appropriate clustering models. The insurance industry typically relied on basic demographic information to segment its customers. While this approach may have been sufficient in less competitive markets, it can lead to oversimplifications and stereotypes. This traditional segmentation model is no longer effective in the modern era of customer-centric and highly competitive insurance businesses. Instead, companies must adopt more sophisticated approaches that consider a more comprehensive range of factors, such as customer behavior, preferences, and needs, to understand and cater to their customers honestly.

Value proposition

Throughout history, insurers have viewed their primary role as aiding customers after a loss. That was a traditional approach to the value proposition in the insurance industry. Nowadays, the value proposition of insurance companies must also prioritize reducing the likelihood of loss for their customers. Preventing losses is preferable for businesses than relying solely on compensation for damages after a loss has occurred. By taking a proactive approach, insurers can assist customers in identifying and mitigating potential risks, such as providing safety inspections, loss prevention advice, and employee training programs. This approach can result in a more sustainable business model, benefiting the insurance company and the customer. In addition, insurers can leverage technology and data analytics to identify emerging risks and offer timely advice to customers, such as preparing for natural disasters or defending against cyber threats. Ultimately, insurers can build customer loyalty and trust by prioritizing risk prevention and mitigation, making their business model more robust (Manchester 2020).

Channels

Insurance product sales have traditionally been carried out by insurers through intermediaries such as agents and brokers, whether company-employed or independent. However, in recent years, alternative distribution channels such as call centers, bancassurance, internet, and mobile have become increasingly popular and have gained significant momentum (Bhattad, 2012). Insurers use several channels. Traditionally, they cooperated with brokers and agents that acted as intermediaries between the insurance company and the customer, helping customers choose the right policies and handling the paperwork. Next, many insurance companies operate call centers that customers can contact to get information about insurance products, make claims, or purchase policies. Call centers are often staffed with trained professionals who can assist customers with their insurance needs. Another channel is bancassurance, which enables the selling of products through banks. In practice, banks partner with insurance companies to offer

insurance products to their customers, often as an add-on service to their banking products. Currently, the Internet is probably the most popular distribution channel. It can be stated that common access to the internet has revolutionized the insurance industry, as it allows customers to compare prices and purchase policies online. Many insurance companies offer websites and mobile apps where customers can get quotes, purchase policies, and make claims. Lastly, probably the most recent distribution channel is the mobile channel. It refers to insurance products and services offered through mobile devices such as smartphones and tablets. Mobile insurance products are often sold through mobile apps or websites, making it easy for customers to purchase policies and make claims.

Customer relationships

The customer relationship block shows the relationships between customers and a company. Those relationships range from personal to automated and may have several motivations, such as customer acquisition, customer retention, boosting sales, etc. In addition, customer relationships have a significant impact on the customer experience.

Revenue streams

Like many other businesses, insurance companies generate revenues primarily by selling products to customers. In the case of insurance companies, they sell insurance policies to customers and receive payment in the form of premiums. The primary way that an insurance company generates profits is by ensuring that the premiums they receive are greater than the claims made against the policies. This is referred to as underwriting profit. Apart from this, insurance companies also earn investment income by investing in the premiums they receive. (Mehta 2022).

- Underwriting: Insurance companies offer insurance policies to individual and corporate clients to obtain premiums. The policies are contracts in which the insurer assumes

financial responsibility for specified loss events in exchange for premium payments from the policyholder. The insurer analyzes past data and applies statistical models to predict potential future loss events, allowing them to calculate premiums. In addition, they utilize actuaries to estimate the likelihood and cost of future claims. In addition, insurance companies strive to maintain profitability by ensuring that the total amount paid out in claims is less than the total premiums received.

- **Investing premiums:** Insurance companies typically invest the premiums they receive from their policyholders in financial markets to generate additional income. Rather than separately investing premiums from individual policies, insurers combine them to form a portfolio. This enables them to offset the impact of significant claims from some policyholders with the premiums collected from others in the portfolio, thereby minimizing overall risk.

Key activities

Insurance companies must engage in various activities to run their business successfully. The key activities are:

- **Marketing:** Advertising and promoting insurance products through agents, brokers, and company websites.
- **Underwriting:** Assessing potential policyholders' risk level to determine the appropriate pricing.
- **Administration:** Managing administrative tasks such as record-keeping, premium collection, customer service, and office management.
- **Investments:** Investing premiums in the capital market to provide security to policyholders.
- **Reinsurance:** Transferring risk to another insurance company through reinsurance contracts.

- Legal and Regulatory Issues: Handling legal matters such as drafting contracts, interpreting provisions, defending the company in lawsuits, and communicating with regulators.
- Claims adjustment: Paying out claims to insured customers who have suffered losses.

Key resources

To fulfill its role effectively, the insurance company requires a set of resources that enables it to manage risks, provide quality customer service, develop innovative products, and generate sustainable financial returns. These resources can be broadly categorized into financial, human, technological, and data resources, each of which plays a critical role in supporting the core functions of insurance companies.

- Financial resources: Insurance companies require capital to underwrite policies, pay claims, and invest in financial markets.
- Human resources: Skilled employees are needed to perform various tasks such as underwriting, claims adjustment, marketing, and administration.
- Technology resources: Insurance companies need advanced systems to manage data, automate processes, and improve customer experience.
- Data and analytics resources: Insurance companies require data and analytics resources to predict risks, set premiums, and monitor performance.
- Physical resources: Insurance companies require office spaces, equipment, and infrastructure to support their operations.

Key partnerships

In the insurance industry, key partnerships are formed with various entities, such as brokers, agents, etc. Brokers and agents act as intermediaries, connecting insurers with customers and helping to grow their business. In turn, brokers and agents receive a commission from the insurer for policies sold. Reinsurers provide insurance coverage to insurers, reducing their risk

exposure and allowing them to underwrite more significant policies. Insurance companies also partner with other service providers, such as law firms, technology companies, and data analytics firms, to enhance their capabilities and improve their overall efficiency operations. These partnerships allow insurers to access specialized expertise, improve risk management, and better serve their customers. Recently, the insurance industry has seen increasing partnerships with companies offering various solutions based on AI and other new technologies. These partnerships have allowed insurers to improve their underwriting, claims processing, and customer service through automation, data collection, and analysis. For example, insurers are partnering with companies that offer AI-powered chatbots to provide 24/7 customer service and with telematics providers to improve risk assessment for auto insurance.

Cost structure

The cost structure of insurance companies is intricate and continuously evolving. According to McKinsey's report "Evolving insurance cost structures," insurance companies' cost structure comprises four main categories: product development, marketing, sales support; operations; other support functions; and IT. In 2012, product development, marketing, and sales support accounted for 19% of costs, operations for 44%, other support functions for 20%, and IT for 17%. In 2017, product development, marketing, and sales support accounted for 25% of costs, operations for 20%, other support functions for 26%, and IT for 29% (Freysoldt et al. 2018). The report suggests that the cost structure will continue to change, mainly due to the increasing use of new technologies.

3. Methodology

This research paper will rely on secondary data to examine the impact of AI and smart devices on business model within the insurance industry. Several vital aspects condition the rationale

for using secondary data. Firstly, it provides access to a diverse range of pre-existing data sources, including industry reports, academic literature, and case studies, which provide a comprehensive understanding of the subject. This allows for a thorough analysis of historical trends, existing business models, and technological advancements.

Secondly, focusing on secondary data can ensure the credibility and reliability of the findings. As the data has been previously gathered, analyzed, and published by reputable sources, the research can benefit from the expertise and validation of these sources. Additionally, using secondary data involves the aggregation of information from multiple sources, which can result in a more holistic perspective on the subject.

Lastly, using secondary data can result in a more efficient research process. Given the predetermined time to complete the Work Project, these inputs allow to focus on analyzing and interpreting the data, which allows for a more streamlined and focused approach to solving the research question.

4. New technologies

Integrating new technologies has opened many possibilities for innovation and transformation across various industries. As technologies continue to evolve and mature, they are increasingly being used in conjunction to improve operational efficiency, customer experience, and decision-making processes. The potential benefits of these technologies are numerous, ranging from predictive maintenance and asset optimization to personalized healthcare and smart cities. One industry that has been resistant to digitalization for many years and is now also making its entry into the world of new technologies is the insurance industry. Modern instruments such as artificial intelligence (AI) and the internet of things (IoT), or blockchain and big data analytics, have the potential to revolutionize various aspects of the insurance business model. They are transforming how policies are sold and underwritten, how claims are processed and analyzed, and how insurers manage risk and combat fraud. Previously known models are

starting to give way to new concepts such as connected insurance, usage-based premiums, or smart underwriting (Vartak and Jain 2019). These technologies offer numerous benefits, including increased efficiency, more accurate risk assessment, cost reductions, and better-tailored products. However, these developments also present several challenges and concerns that must be addressed. First, data privacy and cybersecurity are critical, as the increasing use of connected devices and data sharing exposes customers and insurers to potential data breaches and unauthorized access. Furthermore, ethical considerations, such as the potential for discriminatory practices arising from using personal data in pricing and underwriting, must be carefully evaluated. As the insurance industry continues to embrace and adapt to these technologies, it is essential to strike a balance between realizing their potential and addressing ethical concerns and associated risks.

4.1. Artificial Intelligence (AI)

In today's fast-paced and increasingly digital business landscape, artificial intelligence (AI) has emerged as a game-changing technology that can revolutionize various industries, including insurance, finance, healthcare, and manufacturing. AI refers to developing computer systems capable of performing tasks that typically require human intelligence, such as decision-making, problem-solving, language understanding, and pattern recognition (Figure 2).

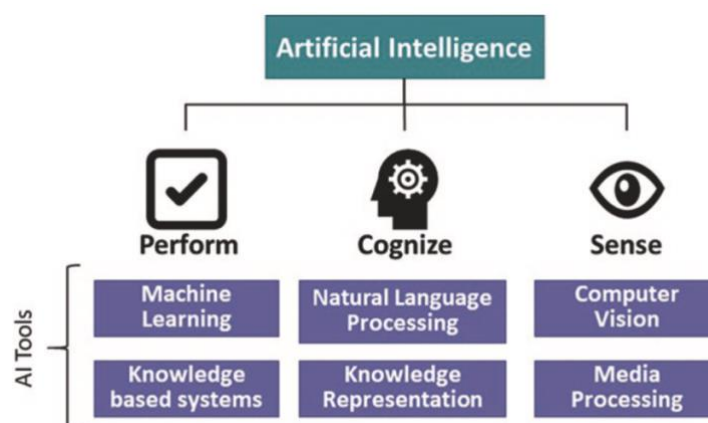


Figure 2. Artificial intelligence tools (Akerkar 2019)

Artificial intelligence offers numerous benefits transforming how businesses operate and analyze data. By efficiently processing and identifying meaningful patterns in vast volumes of data, including text, images, videos, and other unstructured formats, AI enables businesses to gain valuable insights. Self-learning models adapt to changes in data patterns and business conditions, facilitating better and faster decision-making by maximizing data value and transitioning from predictive to prescriptive analytics. Moreover, the ability to uncover unique insights about data archetypes allows for optimal customer segmentation and tailored treatments. Enhanced visualization and transparency make it easier for business users and data scientists to interpret, respond to, and utilize data effectively. Furthermore, AI accelerates innovation and opens new business models and value creation opportunities by uncovering previously undiscovered patterns in data and fully leveraging knowledge assets. (Akerkar 2019)

The evolution of artificial intelligence has been marked by significant events over the past several decades. From the 1950s, when the Perceptron artificial neural network was invented and popularised, to the emergence of expert systems in the 1980s and NLPs together with computer vision (CV) in the 1990s. The explosion of big data in the 2000s allowed AI to become even more powerful, as vast amounts of data allowed machine learning algorithms to become more accurate and efficient. However, deep learning emerged as a dominant technique in the past decade, enabling big data to evolve. (Gold 2023) Today, AI is used in various applications, from self-driving cars to medical diagnosis, and is becoming increasingly accessible to developers and businesses through the availability of open-source tools and cloud-based services. The AI market in 2021 was worth \$327.5 billion (Thormundsson 2023), while AI startups raised over \$50 billion venture capital funding in 2022 (GlobalData 2023).

Artificial intelligence is increasingly integrated into business operations, transforming how companies operate and interact with customers. AI is used to streamline processes, personalize marketing messages, optimize supply chain operations, and improve customer service. By leveraging the power of AI, businesses can automate routine tasks, reducing costs and saving time while gaining insights into customer behavior and preferences. Additionally, it enables businesses to mitigate risks and detect fraud more accurately, enhancing their ability to manage risk. According to Accenture, AI will increase profits by 31% in the financial services sector by 2035 (Purdy and Daugherty 2017). As a result, AI is becoming an indispensable tool for businesses seeking to become more efficient, effective, and customer-centric in today's rapidly changing business landscape.

4.1.1. Artificial Intelligence Solutions

Machine Learning (ML)

Machine learning can be generally described as computational techniques that utilize experience and data to enhance performance or make precise predictions. It is a set of mathematical operations applied to significant data to extract valuable insights. It relies on a variety of techniques and approaches, which can be broadly categorized into three main types:

1. **Supervised learning:** the algorithm is trained on a labeled dataset, where the input data is paired with the correct output. The goal is to learn a mapping between the inputs and outputs, which can then be used to predict new, unseen data.
2. **Unsupervised learning** algorithms work with unlabeled datasets, where the input data has no associated output. The goal is to identify underlying patterns, structures, or relationships within the data, such as grouping similar data points (clustering) or reducing the dimensionality of the data.

3. Reinforcement learning involves a particular task or objective the system needs to accomplish. During this process, it obtains feedback to acquire the preferred behaviors. For instance, the system may experience an error while executing an action or receive a reward for reaching the optimal result. Consequently, the program can determine the most efficient method through reinforcement signals. (Akerkar 2019)

Natural Language Processing (NLP)

Natural languages refer to the languages spoken by humans, as opposed to programming languages like Java or C++. Natural language processing and speech recognition involve the development of computer algorithms that allow machines to understand human language, both spoken and written forms. These technologies are a specialized type of automated pattern recognition known as linguistic intelligence. (Kreutzer and Sirrenberg 2020)

Computer Vision

Computer vision empowers computers to act or make recommendations based on the information extracted from digital images, videos, and other visual inputs. If AI allows computers to think, computer vision enables them to see and comprehend. While computer vision functions similarly to human vision, humans have an advantage due to a contextual understanding. However, computer vision trains machines to perform these tasks using cameras, data, and algorithms in a much shorter time. Consequently, a system designed to inspect products or monitor assets can analyze thousands of items or processes per minute, detecting imperceptible defects or issues and eventually surpassing human capabilities. (IBM n.d.)

Robotic Process Automation (RPA)

Robotic process automation is a software technology designed to create, deploy and manage software robots that mimic human interactions with digital systems and software. Like humans,

these robots can understand screen content, perform appropriate keystrokes, navigate through systems, recognize and extract data, and perform various predetermined tasks. However, software robots can perform these tasks faster and more consistently than humans without requiring breaks or rest. RPA increases workflow efficiency, contributing to the organization's profitability, adaptability, and responsiveness. By eliminating monotonous tasks, RPA increases employee satisfaction, engagement, and productivity. (UiPath 2023)

Chatbot

A chatbot is a computer program that uses artificial intelligence (AI) and natural language processing (NLP) to understand customer inquiries and generate automated responses that imitate a human conversation. Chatbots, by responding to user questions and requests simplify the process of obtaining necessary information without human intervention. This technology is now widely present and can be found in smart home speakers as well as in communication applications. Advanced AI chatbots are called "virtual assistants" or "virtual agents." Users can ask questions or have a conversation, and the chatbot helps them to find answers. (IBM n.d.)

4.1.2. Embracing AI: A Transformational Shift in the Insurance Sector

Traditionally, insurance companies have operated in a product-centric business model, offering standardized policies based on actuarial tables and historical data. However, with the evolution of AI, insurers can now shift towards a more customer-centric approach (Figure 3) by utilizing advanced analytics and machine learning algorithms to personalize policies and services based on individual needs and preferences. (Michaux 2021) We can distinguish four main trends that shape and change the insurance market. The first one is an explosion of data gathered from connected devices enabled to aggregate and analyze customer data, which will allow to better understand clients, provide tailored products, and determine pricing strategies. Second, the use of robotics will greatly impact risk evaluation due to the rise of remotely operated technologies

such as autonomous cars, drones, vehicles, agricultural equipment, and surgical robots. The third trend is the emergence of open-source data to facilitate data sharing and usage across various industries. For instance, auto insurance providers can use autonomous car data to determine premiums and establish risk profiles for insured clients. Lastly, AI-driven transformation in the insurance sector, specifically the adoption of cognitive technologies, such as natural language processing, image recognition, voice recognition, computer vision, virtual agents, and chatbots, will bring about significant changes in the insurance industry. Insurers are expected to leverage these technologies to develop innovative products, optimize processes, reduce costs, and enhance customer experiences. (Vartak and Jain 2019)

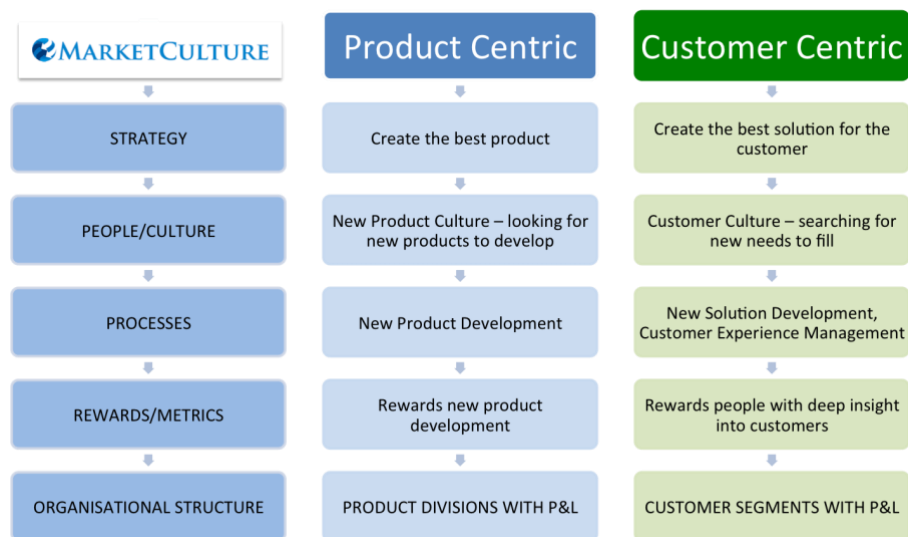


Figure 3. Comparison of product centric and customer centric approaches (Sheth 2020)

Customer Segments

AI tools are changing the customer segments section of the Business Model Canvas in the insurance industry by enabling insurers to better understand and segment their customers. This enhanced understanding of customer current and future needs and preferences, demographics, and pain points enables adequate customer segment definition, leading to a more customer-centric approach and, as a result, maximization of the value of the customer to the business. AI-powered customer profiling tools help insurers gather and analyze customer data, such

as demographics, interests, and behaviors. For instance, one of the largest Japanese insurers uses customer sentiment analysis (CSA), which can generate suitable responses resulting in better customer experience through advanced text analytics. The system combines customer account information with sentiment analysis of distinct customer groups, enabling a detailed comprehension of each client's requirements. By creating detailed customer profiles, insurers can better understand the specific needs of different customer segments and provide tailored solutions. This approach can also help to identify underserved market segments and develop targeted products to cater to their needs.

On the other hand, predictive analytics leverages machine learning algorithms to analyze large datasets and identify patterns, trends, and relationships within the data. This helps in better understanding customer behaviors and preferences, enabling to identify and target specific segments with personalized offerings. For instance, by analyzing past policyholder data, insurers can identify potential high-value customers and target them with tailored products and promotions. (Bieck, Michaux, and Stremel 2020)

Value Proposition

Regarding value proposition, AI tools enhance efficiency, enable innovative services, and improve risk management (Figure 4). Machine learning algorithms can analyze large volumes of data, identifying patterns and trends that humans might miss. This helps insurers make more precise decisions, offer more accurate pricing, risk assessment, and develop customer-focused products. What is more, natural language processing allows insurers to process unstructured data from sources such as customer feedback, emails, and social media. This results in a better understanding the customer needs and preferences, allowing to refine products and services to make them more suitable. (Gentsch 2018) In addition, computer vision technology enables computers to interpret and analyze images or videos, which can be useful for damage assessment and claims processing. By automating these processes, insurers can offer faster,

more accurate claims handling, reducing the costs of this process even by 30% (Chattopadhyay 2019).

When it comes to telematics and AI algorithms, they allow to offer usage-based insurance products. As in the case of Cuvva company (case study 2. Company: Cuvva), AI enables the analysis of large amounts of customer driving data. This makes it possible to offer a perfectly tailored product to the customer. In addition, the prices are also adjusted according to the driving habits, and thus Cuvva can offer the lower price possible. Such technologies can lead to better flexibility and customization for clients, more accurate pricing, and a better understanding of risk, ultimately creating a stronger value proposition for customers.

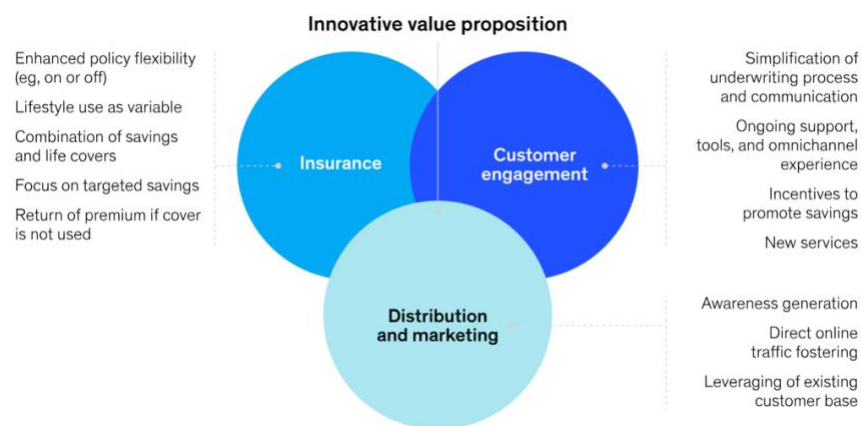


Figure 4. The innovative value proposition for insurance (Ellingrud et al. 2022)

Channels

AI instruments enhance how insurers interact with customers and deliver their products and services, making the purchasing experience faster. AI-powered chatbots and virtual assistants can handle customer queries, policy recommendations, and claims processing conversationally by providing instant, accurate responses, leading to the improvement of customer service and support while reducing the workload on human customer service representatives. As a result, the role of insurance agents has changed a great deal as more and more companies rely heavily on technology to improve efficiency and boost productivity. Agents make use of intelligent

personal assistants and AI-powered bots to streamline their tasks and identify potential opportunities for customers. These tools enable agents to serve a significantly broader clientele while making customer interactions concise and impactful, as each interaction is customized to address every client's precise present and future requirements. (Balasubramanian, Libarikian, and McElhaney 2021) AI can also create personalized email campaigns and social media content, helping engage with its audience through the proper channels and providing 24/7 support. Machine learning algorithms can also optimize email delivery times and social media posting schedules to maximize engagement and conversions. Moreover, thanks to AI, it is possible to create more engaging and user-friendly digital platforms, such as websites and mobile apps, that help customers easily find the information they need and complete transactions. Voice-enabled AI assistants, like Amazon Alexa or Google Assistant, can provide policy information, answer questions, and even process transactions through voice commands, which creates a seamless and convenient experience for customers, making it easier for them to interact with the insurer through their preferred channel. (Gentsch 2018)

Customer Relationships

AI tools enable insurers to better understand, engage with, and serve their customers. Chatbots and virtual assistants can improve customer satisfaction and foster stronger relationships by automating routine tasks and providing personalized assistance. For example, 38% of consumers consider virtual assistants a relevant self-service instrument to interact with insurers (Bieck, Michaux, and Stremel 2020). Companies can also communicate with customers using natural language, making it easier to engage with different customer segments in a more personalized manner. These tools can help answer customer queries, provide policy recommendations, and even process claims, providing a seamless and tailored experience. OP Financial Group reduced their customers' wait time to zero thanks to an intelligent chatbot.

Moreover, AI-driven personalization algorithms analyze customer data to create highly customized product offerings, communication strategies, and user experiences, creating a tailored approach to individual customer preferences and needs. It can result in a stronger connection and drive customer loyalty. Additionally, predictive analytics uses machine learning algorithms to analyze historical data and forecast customer behavior, enabling insurers to address potential issues and provide timely, relevant assistance proactively. This can help to anticipate customer needs, improve service quality, and strengthen customer relationships. AI instruments can analyze customer data to identify patterns and signals that may indicate potential churn, enabling to retain valuable customers. By understanding the factors that contribute to customer dissatisfaction, it is possible to take action to improve service quality.

Revenue Streams

Predictive analytics and machine learning algorithms allow companies to analyze customer data and create highly personalized pricing structures based on individual risk profiles, leading to increased revenue streams. AI-powered telematics and IoT devices collect real-time data on customer behavior, then by analyzing them, enable to offer usage-based insurance products, such as pay-per-mile auto insurance or on-demand coverage. By providing more flexible and customized insurance options, insurers can tap into new customer segments, generate additional revenue, and identify opportunities for cross-selling or upselling, recommending additional products or services that align with a customer's needs and preferences. By offering relevant, personalized recommendations, insurers can increase their revenue per customer and drive growth. Another relevant issue is the AI potential to minimize losses and risk through fraud detection and risk management. Companies can effectively identify suspicious activities, uncover patterns indicative of fraud, and swiftly address fraudulent claims. Thanks to real-time analysis of vast datasets, insurers can detect anomalies and inconsistencies that would be difficult to identify through manual efforts. Moreover, AI-based predictive analytics allow

proactively anticipating and mitigating potential risks, ensuring a more accurate risk assessment for each customer. Shift Technology has created an AI-driven solution that utilizes big data and machine learning algorithms to detect and pinpoint fraudulent insurance claims (case study 1. Company: Shift Technology). So far, the system has processed more than 78 million claims, with a 75% accuracy rate, which is expected to improve as time goes on and data volume increases. (Vartak and Jain 2019) Insurance companies can significantly reduce losses, protect their bottom line, and maintain trust with their policyholders by enhancing fraud detection capabilities and optimizing risk management strategies.

Key activities

AI tools are significantly transforming key activities in the insurance industry, streamlining operations, enhancing decision-making, and driving innovation across various functions such as marketing, underwriting, administration, investments, reinsurance, legal issues, and claims adjustments. In marketing, AI-driven personalization algorithms can help create highly targeted campaigns by analyzing customer data, preferences, and behavior, leading to more effective actions and higher conversion rates. Regarding underwriting, predictive analytics, and machine learning algorithms enable the analysis of vast amounts of data from various sources, leading to more accurate risk assessment and underwriting processes. AI can help in the development of sophisticated risk models, improvement of pricing accuracy, and expedite the issuance of the policy. When it comes to administration, robotic process automation can automate repetitive, time-consuming administrative tasks, including data entry, policy management, and document processing resulting in better efficiency, reducing human error, and lowering operational costs. In respect of investments, AI-driven algorithms can help to optimize investment strategies by analyzing market data, trends, and risk factors. This enables identifying new investment opportunities, making more informed decisions, and managing portfolios more effectively.

Moreover, AI can improve the reinsurance process by providing better risk assessment, enabling optimization of reinsurance strategies, and negotiating more favorable terms. Additionally, AI can help reinsurers develop more accurate catastrophe models and better understand the potential impact of various risk factors on portfolios. Natural language processing and machine learning can help to review legal documents, contracts, and regulations more efficiently. By automating the analysis of legal texts, insurers can reduce the time spent on legal research and risk assessment, ultimately improving compliance and reducing potential liabilities. Finally, AI instruments can streamline claims adjustments by automating tasks like damage assessment, fraud detection, and claims validation. One of the examples is an AI-based claim damage assessment tool (CDAT) used by the IFFCO Tokyo General Insurance Company to improve the assessment of claims (Michaux 2021). This proves that AI-powered computer vision technology can analyze images or videos of damaged property, enabling insurers to offer faster, more accurate claims handling. Fraudulent activity may be identified if the submitted documents lack authenticity or the requested insurance amount exceeds the required coverage to gain profit, raising concerns about the indemnity policy. (Vartak and Jain 2019)

Key resources

AI helps to enhance the efficiency and effectiveness of various aspects, such as financial, human resources (HR), technology, data and analytics, and physical resources. AI-driven analytics may help to optimize financial resources by providing valuable insights into investment strategies, risk management, and pricing models. Thanks to AI tools, making more informed decisions about allocating financial resources and managing risk is possible, ultimately improving the company's financial performance. When it comes to HR processes, such as recruitment, onboarding, and talent management, they can be enhanced by automating repetitive tasks and providing data-driven insights. Moreover, AI can help to identify and attract top talent, predict employee attrition, and develop personalized training programs,

ultimately improving workforce productivity and retention (Mehrotra 2022). Technology resources can be automated by enhancing decision-making and improving the user experience. For instance, chatbots and virtual assistants can help to deliver seamless customer support, while predictive analytics can improve decision-making across various functions. By investing in AI-driven technologies, companies can stay ahead of the competition and drive innovation in their products and services. What is more, data and analytics tools enable insurers to analyze vast amounts of structured and unstructured data, providing valuable insights that support better decision-making across various business functions. Those analytics provide a deeper understanding of customer preferences, market trends, and risk factors, ultimately driving growth and improving operational efficiency. (Bieck, Michaux, and Stremel 2020) Lastly, AI tools may help to streamline physical resources, such as office space and equipment. As AI-driven IoT devices can monitor and manage energy consumption, insurers may be able to reduce their environmental footprint and save on operational costs.

Key partnerships

Many traditional insurers partner with insurtech startups specializing in AI and other emerging technologies to gain access to innovative solutions and expertise. These partnerships can help insurers improve their underwriting, claims processing, risk assessment, and customer service, ultimately driving growth and enhancing their competitive advantage. By gaining access to sophisticated AI tools, insurers can make better-informed decisions, optimize operations, and better understand their customers' needs and preferences. (Haponik 2022)

Additionally, collaborations with companies specializing in AI-driven claims management and fraud detection solutions lead to automated claims processing, improved fraud detection, reduced losses, and enhanced operational efficiency. Insurers are also forming partnerships with providers of AI-powered customer support solutions like chatbots and virtual assistants, delivering seamless, personalized support that boosts customer satisfaction and loyalty.

Moreover, AI-driven HR and talent management solution providers are instrumental in optimizing HR processes, from recruitment to retention, as they help identify top talent, predict employee attrition, and design personalized training programs. Finally, partnerships with firms specializing in AI-driven risk modeling and catastrophe prediction solutions allow insurers to develop more accurate catastrophe models, better understand the potential impact of various risk factors, and optimize their reinsurance strategies. (Wilson 2023)

Cost structure

The cost structure of insurance companies is complex and constantly evolving, with technology playing a significant role in driving these changes. It is defined by four main factors in the industry: the size of the company, geography, product lines, and the sales channel (Management Study Guide n.d.). As highlighted in McKinsey's report, the shifting allocation of costs among product development, marketing, sales support, operations, other support functions, and IT demonstrate the industry's increasing reliance on new technologies. Given all the advantages mentioned in the previous sections, as a result of AI implementation, insurance companies are able to reduce marketing costs while improving their efficiency. Expenses related to sales support can be decreased due to better-suited sales channels and automation of many activities associated with this field. When it comes to the administration and processing claims, online platforms equipped with chatbots that handle claims automatically result in cost reduction, while RPA solutions automate routine tasks and reduce human error. (Freysoldt et al. 2018) AI is also helping insurers optimize their support functions, such as HR and talent management, by improving workforce productivity and reducing overhead. (Krishnakanthan et al. 2021) On the other hand, to achieve all the benefits mentioned above, increasing spending on new technologies and product development will be necessary. It is crucial to invest in IT architecture, digitalization, and security. (Freysoldt et al. 2018)

4.1.3. Conclusion: Evaluation of the Influence of Artificial Intelligence on Business Model in the Insurance Industry

The insurance industry is expected to be significantly impacted by artificial intelligence and its related technologies. These advancements are predicted to have a transformative effect on all areas of the industry, including distribution, underwriting, pricing, and claims. Advanced technologies and data are already affecting distribution and underwriting, resulting in policies being priced, purchased, and bought almost immediately. (Balasubramanian, Libarikian, and McElhaney 2021) Overall, AI is driving a shift towards more customer-centric, data-driven, and innovative business models in the insurance industry, paving the way for new opportunities and improved customer experiences.

With AI's changes and opportunities, two new business models are emerging for insurance companies. The first one, being on demand insurance, allows customers to purchase protection only when they need it. This model applies to specific events, items, or timeframes and is tailored to the individual needs and preferences of the policyholder. Unlike traditional insurance policies that provide continuous coverage, on-demand insurance can be activated or deactivated as required, offering a more cost-effective and customizable solution. AI technologies play a crucial role in enabling the on-demand business model in insurance, as they facilitate the rapid assessment and management of risk while providing personalized and flexible coverage options. Machine learning algorithms and advanced data analytics can process vast amounts of real-time data to determine risk profiles and calculate appropriate premiums accurately. At the same time, AI-powered chatbots and digital assistants streamline the customer experience by offering instant quotes, processing claims, and providing support, all within a highly responsive and user-friendly platform.

The second business model is usage-based insurance, which is a model that calculates premiums based on the actual usage, behavior, or risk exposure of the policyholder rather than

relying solely on traditional factors such as demographics, location, or historical data. This personalized approach allows insurers to offer coverage that more accurately reflects the policyholder's risk profile, leading to fairer and potentially lower premiums for safer and more responsible users. AI technologies facilitate collecting, analyzing, and processing real-time data to create personalized coverage options. Machine learning algorithms and advanced data analytics can efficiently process vast amounts of data gathered from telematics devices, IoT sensors, and wearable gadgets, providing insurers with insights into the policyholder's behavior, habits, or usage patterns. This information allows insurance providers to calculate premiums and coverage options that accurately reflect the individual's risk exposure, leading to fairer and potentially more cost-effective insurance policies.

By leveraging AI tools and techniques, insurance companies can better understand and serve their customer segments, leading to more personalized and innovative products, improved customer satisfaction, offering improved efficiency, and ultimately, increased customer satisfaction, loyalty, and competitiveness in the market (Figure 5).

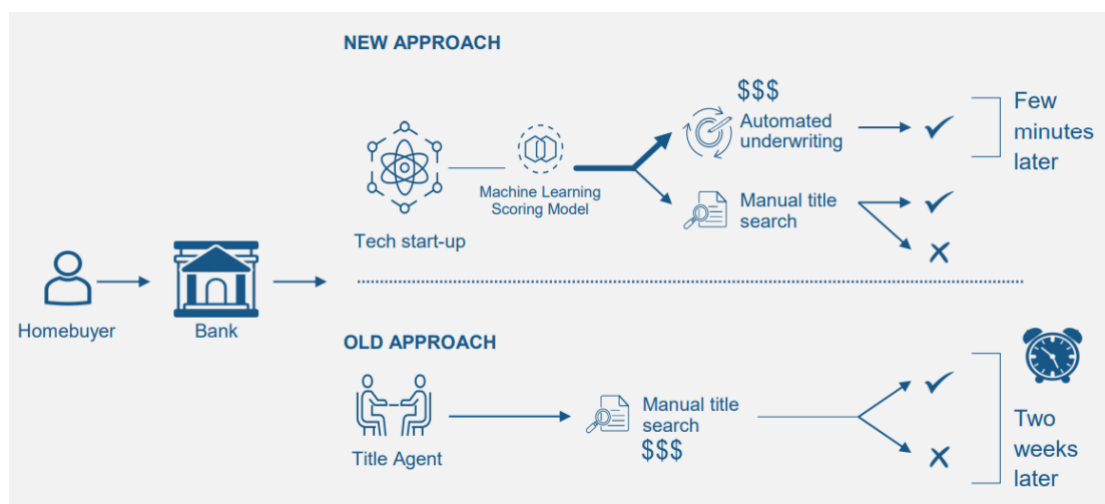


Figure 5. An improved underwriting process through machine learning (Mayer 2021)

5. Disruptors

Data privacy and security matters are becoming increasingly important as new technologies continue to reshape the insurance industry. Intelligent devices are generating an unprecedented

amount of data that insurance businesses can leverage for more accurate risk assessment, personalized premiums, and improved customer service. However, data privacy concerns represent a significant limiting factor in developing these new insurance models.

Firstly, collecting, storing, and using personal data from smart devices can raise serious privacy concerns among consumers. Personal data derived from smart devices can be compassionate, often relating to health, location, and personal habits. Consumers may not be comfortable with their insurance company having access to such detailed personal information, fearing it could be misused or shared without their consent. This can lead to reluctance to share data, limiting how much data insurance companies can collect and use. Consumers may question whether it is worth giving out their private data for a discount on their policy.

Secondly, strict data protection regulations in many jurisdictions govern how personal data can be collected, stored, used, and shared. These regulations often require companies to obtain explicit consent from individuals before collecting their data and to implement robust measures to protect this data. Non-compliance can result in legal issues and reputational damage. Insurance companies must carefully navigate these regulations, which may lower the adoption of new technologies and limit the scope of data usage.

Moreover, using personal data from smart devices can lead to discriminatory practices. For example, if insurance companies use data from health-tracking devices like fitness trackers or health-monitoring apps to adjust premiums, this could discriminate against individuals with health conditions. That, in fact raises ethical issues that must be addressed. This could result in a new form of discrimination, as people with health issues, pre-existing health conditions, or those with unhealthy habits could be burdened with additional costs or be excluded from obtaining insurance. What is more, the use of personal data from smart devices might deepen existing inequalities in healthcare. For example, people from lower socioeconomic backgrounds, who may have less access to technology and resources for maintaining good

health, could be disproportionately affected by higher premiums based on their health data. This could further widen the healthcare access and affordability gap between different population segments.

Lastly, the risk of data breaches is a significant concern. Given the sensitive nature of the data collected by insurance companies, they are attractive targets for cybercriminals. A data breach can result in substantial financial costs, loss of customer trust, and regulatory penalties.

Using smart devices offers significant potential for the development of the insurance industry, yet data privacy concerns pose a significant challenge. In addition, insurance companies must carefully balance the benefits of leveraging data from smart devices with respecting privacy, complying with data protection regulations, and maintaining customer trust.

6. Conclusion, limitations, and future research

6.1. Conclusion

Based on this Work Project findings, by analyzing the business model based on the business model canvas framework, is it possible to state that new technologies do impact business model in the insurance industry. They allow to shift from a product-centric to a customer centric approach, mainly due to the ability to collect accurate data and analyze it with all sorts of algorithms that were not previously available. As a result, new concepts and business models are being developed, such as on-demand insurance or usage-based insurance. Answering the research question: how new technologies impact the business model in the insurance industry, it can be stated that they can bring many benefits for businesses. Through analysis of the two technologies described in the Work Paper: smart devices and artificial intelligence, it can be concluded that smart devices collect data that provides insights about consumer habits, behavior, and preferences, while AI algorithms and tools facilitate the processing and interpretation of this information. Subsequently, this data can be used to enhance the understanding of consumers, develop better personalized products that respond to individual

user needs, better assess risks, and therefore optimize pricing strategies. Furthermore, these technologies contribute to more effective marketing activities and establish stronger customer relationships, leading to increased customer retention. Overall, integrating these technologies makes companies more competitive and better equipped to generate value for their stakeholders.

However, it must be remembered that along with the dynamic development of new technologies, legal aspects are also developing, aimed at protecting personal data and privacy in the digital transformation era, which may not allow for such rapid adoption of those technologies by companies. Insurance-related data, driving habits, and health data can be particularly sensitive and, on the one hand, allow for ideally personalized purchase plans, but on the other, poses a real threat to one's privacy.

6.2. Limitations

While this work project aimed to provide a comprehensive understanding of new technologies' impact on the insurance industry's business model, certain constraints may have impacted the scope and depth of the findings. Acknowledging these limitations is essential to provide context for the analysis and identify areas for future research. One of the limitations of this study is the inability to conduct a comprehensive analysis of financials to evaluate the impact of new technologies a company uses on its performance. Ideally, a thorough examination of companies' financial data would provide valuable insights into how different tools' implementation affects financial performance. However, the assessment is restricted to secondary data due to the lack of access to such information. Consequently, this limitation might affect the comprehensiveness and depth of the study's findings, potentially leading to a less robust understanding of the true impact of new technology adoption within the insurance sector.

Another constraint is the amount of data and information, which is limited. The use of new technologies is a relatively new concept, gaining ground all the time. Thus, companies may not yet be giving public notice of how exactly they are using these technologies to gain a competitive advantage in order not to disclose too much information. Therefore, there is insufficient data on specific technologies and tools, as well as how exactly they are used by companies which can lead to an incomplete understanding of the effects of each technology on the insurance business model.

6.3. Future research

Building on the findings and acknowledging the limitations of this study, several opportunities for further exploration can be identified.

First, primary data collection can address the limitations associated with secondary data. Future studies could collect primary data through surveys or interviews with industry experts, insurance companies, and technology providers. This approach would allow for a more tailored investigation of the research topic and help uncover new insights.

Following this approach, a comparative analysis could be done. Future research could focus on comparing the impact of new technologies on business models across different regions, insurance segments, or company sizes. Such analysis would help identify trends, best practices, and unique challenges various market players face.

Moreover, to gain a deeper understanding of the effects of individual technologies, future studies could investigate the impact of specific innovations, such as blockchain, on business models within the insurance industry.

In conclusion, while this Work Project research has shed a light on the impact of new technologies on the business model in the insurance industry, there is still some gap to explore in this rapidly evolving field. Undoubtedly, addressing the abovementioned studies would positively influence the quality and depth of analysis and improve the topic's understanding.

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8. Appendices

8.1. Case study 1. Company: Shift Technology (Shift Technology 2023)

Shift Technology is a Paris-based startup founded in 2014, focused on providing cutting-edge AI-based software solutions to insurance companies for detecting fraud patterns. Their innovative product suite utilizes advanced data analytics and machine learning algorithms to identify and prevent fraudulent claims, ultimately saving insurers money and protecting policyholders. This case study explores the company's background, the AI technology used, the advantages of implementing Shift's solutions, and its financial data.

Technology used

Shift Technology's products include AI-driven solutions enabling insurance providers to streamline and enhance decision-making processes from underwriting to claim management. They use sophisticated machine learning algorithms and big data analytics to analyze vast amounts of structured and unstructured data from various sources, such as claim records, policyholder information, and external databases. The system identifies potential fraud patterns and assigns a risk score to each claim, allowing insurers to prioritize investigations and optimize resources.

Advantages

1. Improved fraud detection: The AI-driven system can identify subtle patterns and relationships that human investigators may miss, leading to higher detection rates and better prevention of fraudulent claims.
2. Cost savings: By automating the fraud detection process, insurers can reduce the time and resources required for manual investigations, translating to significant cost savings.

3. **Faster claim processing:** With the help of AI-based prioritization, insurers can expedite the processing of legitimate claims, improving customer satisfaction and enhancing the overall claims experience.
4. **Continuous learning:** machine learning algorithms continually adapt and improve as new data becomes available, ensuring the system remains updated with evolving fraud tactics.

Financial data

Since its inception, Shift Technology has raised during its latest funding round in May 2021 \$320 million, bringing the company's valuation to over \$1 billion. This substantial investment highlights the growing recognition of AI's potential in the insurance industry.

Shift Technology has reported a significant growth in recent years, with a revenue increase of over 200% between 2020 and 2021. By the end of 2021, the company had identified more than five billion dollars in claims fraud.

8.2. Case study 2. Company: Cuvva (Cuvva 2023)

Cuvva is a UK-based insurtech startup that leverages AI technology to offer flexible, usage-based car insurance tailored to individual driving habits and needs. Founded in 2014 by Freddy Macnamara, Cuvva has transformed the traditional auto insurance landscape by providing short-term, pay-as-you-go coverage through a user-friendly mobile app.

Technology used

Cuvva employs AI algorithms and telematics data to assess risk, calculate premiums, and tailor coverage to users' driving habits and needs. By gathering real-time information on factors such as location, speed, and driving behavior, Cuvva's AI-driven platform can more accurately determine risk and price policies accordingly. Furthermore, the company uses machine learning to continually refine its risk assessment models, ensuring a more accurate and personalized approach to auto insurance.

Advantages

1. Flexibility and customization: Users can purchase coverage on-demand, for durations as short as an hour or up to several days, providing a more adaptable and personalized solution for their unique needs.
2. Cost savings: By aligning premiums with actual driving habits and usage, Cuvva offers a more equitable pricing model that can lower costs for responsible and infrequent drivers.
3. User-friendly experience: Cuvva's mobile app streamlines the insurance purchasing process, allowing users to obtain coverage within minutes, manage their policies, and access customer support with ease.
4. Encouraging safe driving: The usage-based model incentivizes drivers to adopt safer habits and minimize unnecessary driving, benefiting both the environment and the policyholder.

Financial data

Cuvva has sold more than 6,5 million policies. The company has experienced rapid growth, expanding its active user base to over 650,000 policyholders by 2023. Although the exact financial data is not publicly available, Cuvva's growth trajectory and fundraising success indicate a strong market presence and a promising future for the insurtech startup.