AI Is Transforming Insurance With Five Emerging Business Models

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INTRODUCTION

Artificial Intelligence is transforming the way we work and our personal lives (Faraj et al., 2018). More generally, software is taking over more and more processes in organizations, often changing their business model (Alt et al., 2020). This digital transformation is also happening in the insurance field. The impact of AI in insurance is in some ways similar to other sectors of the economy, but in other ways, different. Insurance has some particularities, and events such as AI transformation, recession, and pandemics affect it differently. It is therefore important to understand the adoption of AI and how this will influence insurance business models. An insurance business model must be effective and durable because insurance faces several challenges, such as more pandemics, constantly changing regulations, climate changes, unpredictable weather, and fierce competition (Kannan & Bernoff, 2019). There are many opportunities offered by technology such as AI, big data, cloud computing, IoT, blockchain, and 5G. Machine Learning (ML) and Deep Learning (DL) offer learning that can be supervised or unsupervised, making AI more capable and more accessible to organizations (Kraus et al., 2020). All these separate technologies are converging, creating synergies, and amplifying their impact (Dietzmann et al., 2020). Insurers have a role in shaping AI and its impact. Additionally, consumers and the government also have their roles. The government needs to develop and adapt laws and regulations. Insurers face sociotechnical challenges with AI from within the organization. These can include the data, the people, and the processes. The data is often not large enough in volume or quality to effectively train AI or to use AI to perform evaluations and underwriting. Because of the increasing role of technology, there is also an increasing role for technology providers. Insurers' personnel need new skills and training to implement AI.

　　While we are looking at the whole insurance sector, it is important to recognize that there is a distinction between insurers that attempt to cover all the insurance services for the consumer and those that focus primarily on one type of insurance. In the data-driven economy, data, its sources, and how these are utilized, is another way to explain a business model. The impact of AI and other technologies such as IoT and blockchain are so important that the sociotechnical capability to utilize them is more significant today than in the past. Currently, most implementations of AI replace specific processes that had specific challenges in the past. To understand the adoption of AI, we must understand each organiza-

tion's present state and their journey as an insurer in utilizing technology in general, and AI specifically. Identifying the transformative effect of technology on business models is a popular way to contribute to our understanding of new business models (Veit et al., 2014). Therefore, the research question is: "What are the emerging business models in insurance caused by AI and data technologies?"

This research found empirical support for five emerging AI-driven business models in insurance: (1) Focus and disaggregation, (2) absorb AI into the existing model, (3) incumbent expanding beyond model, (4) dedicated insurance disruptor and, (5) tech company disruptor. The following section is the literature review followed by the methodology section that explains how the case studies were identified and explored. Then the analysis of four exemplar cases is shown, a discussion on the validity and value of the business models is identified, and finally the conclusion is presented.

LITERATURE REVIEW

The literature review covers three areas. Firstly, artificial intelligence and related technologies, secondly, the current literature on business models, and thirdly, current trends in insurance.

Artificial Intelligence-Driven Automation

AI is spearheading several interrelated technologies, including big data, IoT, blockchain, and 5G (Tarafdar et al., 2019). Additional new technologies, such as quantum computing, are not far behind and could join the aforementioned technologies, further speeding up the disruption (Corcoles et al., 2019). AI includes machine learning and deep learning, offering the ability for a system to learn in a supervised or unsupervised way. Virtual assistants powered by AI, often referred to as chatbots, interact with customers, covering more and more processes as their abilities grow (Zarifis et al., 2021). Big data is enabling a constantly increasing collection of data from people and the environment, and making it more manageable to gain insight and utilize this data (Mikalef et al., 2020). This data is collected directly by insurers, but also purchased from other private or public organizations. IoT is particularly important for insurance, because it enables real time monitoring of information related to risk and automatic payouts without the customer even making a claim. Blockchain and distributed ledger technologies are particularly useful to support decentralized storing and the sharing of data in a transparent and secure way. As insurers are increasingly relying on an ecosystem around them, blockchain can support such collaboration. The step-change in bandwidth that 5G provides supports the other new technologies, but also offers some unique opportunities, such as richer, more immersive, interactions with their consumers (Park et al., 2021).

Business Models

Business Model Theory

There are different perspectives on business models, including a more business or more technology focused perspective (Osterwalder et al., 2005). For insurance, it is increasingly important to take a technology centric perspective. Exploring a business model requires a broad perspective to understand all of the processes of an organization and then to focus on the most important ones. For insurance, it needs to be clear where the organization fits into the supply chain, how they add value, and where they have a competitive advantage over competitors. In this sector, the context is critical. For example, insurance is

heavily influence by each country's laws and regulations. In addition to the context, recent developments such as the rise of platforms and comparison cites are changing the way of working (Hukal et al., 2020).

Insurance Business Models

There are several insurance services across commercial insurance (B2B) and consumer insurance (B2C). There are also several organizations involved in a supply chain delivering each of these services. The most prominent are comparison websites, insurers, and reinsurers. Within these typical processes, each insurer can fulfil just one, or several of them. The choice of processes within the value chain does not happen once at the organization's inception, but on an on-going basis as the environment evolves. Factors influencing the evolution include but are not limited to the competition, consumer, economy, weather, regulation, and technology (Zarifis & Cheng, 2021).

Theoretic Foundation

The initial stages of this research identified the importance of focusing on the technology to understand the new business models, and which technologies are the most influential at disrupting the previous ways of working.

Based on related research, the four insurance business models for AI-driven automation are:

1. In the third business model: The focus is on strategy and disaggregation. In this model the insurer implements a smaller part of the value chain, has a larger ecosystem, and may join a platform.
2. In the second business model: The insurer utilizes AI across their value chain, but does not change their business model to accommodate AI led automation.
3. In the third business model: The insurer expands further than the insurance value chain, seeking more data and becoming the platform.
4. In the fourth business model: A tech company expands into the insurance value chain offering their own services (Zarifis et al., 2019).

The business models illustrate the increasing role AI and data will have in the future. They have been proven to be valid thus far. This model is used as the foundation to further evaluate the issues.

METHODOLOGY

The methodology applied evaluated four case studies from insurance and built theory from them (Eisenhardt, 1989). The literature on insurance business models gave us a theoretic foundation, but further exploration was required. Four organizations from the insurance supply chain that are being influenced by AI-driven automation were selected. The cases were chosen after initially evaluating how 15 insurers fit into the existing model with four categories (Zarifis et al., 2019). The first stage was desk-based research. As these are large public companies, so there is extensive information available about their operations, both from themselves and other reputable sources. The second stage included three interviews from each company. The interviewees were involved in making the decisions on how to adopt AI. One interviewee from each company had a technical background and was involved in implementing the new technologies. Four constructs were used to evaluate the cases. All of the interviews were conducted in English.

Figure 1. Research method
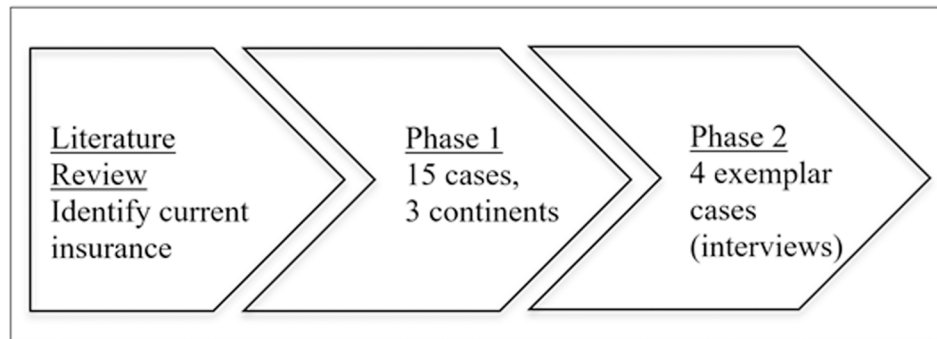
CASE STUDY ANALYSIS

The four case studies were chosen because they represent the four categories identified in the literature, and the two subsections identified in the preliminary analysis of 15 cases. The first case chosen covers 'focus and disaggregation,' and 'absorb AI into existing model.' The second case is 'an incumbent expanding beyond model,' the third is 'a dedicated insurance disruptor' (4a), and the fourth is a 'tech company disruptor' (4b).

Case Study 1: Focus and Disaggregation / Absorb AI Into Existing Model

Position: Large incumbent, traditional insurance company

Insurance provided: Car, home, life, health, travel, business, and others

Location: UK

Description of the AI Application

Approach to Applying AI

This insurer is focused and disaggregated in some services it offers, while it keeps its business model the same in other services it offers. It has several partnerships with established companies in various sectors such as electric cars and start-ups specialised in technology, online life insurance, and other sectors such as property. This enables the insurer to create a portfolio of technologies, including AI.

It has developed its in-house capability with technology. However, it recently shifted its focus from young start-ups to mature technologies that can have an immediate impact. This case is not interesting because of an innovative use of AI, but it is interesting because it is an effective way to utilize recent advances in AI across several parts of their business. They are more focused on finding ways to utilize technology than to develop it. Instead of an insurance company turning into a tech company to fully utilize technology, they are sticking to what they do best and creating intelligent partnerships.

Specific AI Technologies

Several customer-facing processes are completed by self-service and AI. A virtual assistant can also interact with customers. It supports the customer in several ways, such as obtaining an insurance quote, choosing premiums and deductibles, filing a claim, and setting up payments.

A virtual assistant is used by employees for easier access to relevant information. It can answer general questions about insurance and specific questions on claims and deductibles. As this virtual assistant can be trained with machine learning, it is capable of offering new insurance products quickly, without the delay that it would take to retrain human personnel. The virtual assistant can be trained to offer a completely new product line that was not previously offered by the company.

Underwriting: AI supports an underwriting tool that uses machine learning to evaluate all of the cases for quality assurance and can identify those that need to be checked by a human.

AI is used for several risk assessment evaluations. AI can go through reports in text, such as engineering reports and risk evaluations. To ensure regulatory compliance, AI analyses contracts.

Claims processing is moving towards a self-service process supported by AI. The consumer can monitor their application status online. AI analyses trends in claims and predicts the rate of claims in the future.

Fraud detection and reduction: AI finds patterns in data, helps detect cases that are less typical, and cannot be identified by a rules-based system. AI evaluates all of the claims for fraud and identifies the most suspicious ones for evaluation by human personnel. AI is better at learning and adapting to new threats than rules-based software.

The Underlying Technology

The implementations of AI are not unique and can be found in other leading insurers. Given the level of maturity of AI in general and the capability to utilize AI of this organization specifically, AI can currently be used in several specific processes. As the capabilities of AI improve and the ability of this specific insurer to utilize AI improves, the insular iterations of AI can be connected for a more comprehensive solution.

- **AI and Data:** The technology utilizes AI including deep predictive models and cognitive learning. A strong understanding of existing data and how to utilize it with AI is necessary. AI is working together with automation to provide seamless 'intelligent automation.' Mobile apps and an online portal provide the user with insurance customised in terms of its limits, coverage, deductibles, and excesses.
- **Voice Assistant:** This insurer's chatbot benefits from the technology provider's breadth of expertise in natural language processing. The virtual assistant's AI applies machine learning that uses the typical training data but also information from social media. Furthermore, every real interaction is utilized to further train the AI.
- **Audit:** Machine learning is ideal for a preliminary audit of underwriting for several reasons. Machine learning is very effective in analysing large volumes of data and finding patterns. In this process there are large volumes of structured data, which is ideal for machine learning.

Challenges and Regulatory Implications

This implementation of AI is not the most ambitious, so the challenges and regulatory implications are limited. The final decision is usually made by a human being. Most solutions are 'off the shelf' proven

solutions with some customization so the challenges are reduced. Using AI to support current staff in their current roles will encourage them to adopt it and reduce their resistance.

Its partners are also competitors, so a network of frenemies is developed. Nevertheless, by developing in-house expertise on AI and contributing to the community of AI and new technologies in insurance strengthens its position to create partnerships with the right partners at the right time.

It is active in some highly regulated markets where the process needs to be transparent, and in other less regulated markets where the process does not need to be so transparent. This reduces the benefits of AI and increases the challenges to implementing it. For example, the regulation in some countries allows for pricing to be flexible and dynamic while in other countries this is not allowed. The unpredictability and limited transparency AI can have may pose challenges when it comes to defending the validity of the fraud claims, for example. Therefore, it is important to engage on the ethical and privacy challenges AI brings and how the algorithms can be transparent.

The Business Model

This insurer is now focused on adding value as an insurer and leading in technology and AI through partnerships, not on its own. This insurer tries to get the best of both worlds by keeping its model, to some degree, but also being part of new developments. Keeping the original model has merit because there is expertise in underwriting that is valuable. This expertise can be in highly specialised underwriting services that have not been disrupted and may not be disrupted for some time. Therefore, only the parts of the organization that should be simplified are made more focused with AI.

AI influences all the aspects of the business including the nature of the products and services, the prices, and the exposure to risk the organization is willing to take. This includes business customers and individuals.

The strategic logic is to avoid using resources on technology, as that is not where the core strengths of the company are. If one of the several partnerships fails it can be mitigated by the success of other partnerships. It is important to create an ecosystem that is stronger than what could be achieved singularly. It is challenging for most organizations in insurance to keep up with the rate of change.

Timing is important when implementing the new wave of technologies, including AI. Having the capabilities internally, and selecting mature proven technologies is necessary. The current cases of AI appear to suggest an incremental evolution of the model.

This insurer collaborates closely with the technology partners it co-develops solutions with. These solutions may be used by other insurers, but as a preferred partner, they will be one of the first applying each new AI solution and will, therefore, gain an advantage. The insurer uses the 'best of breed' solutions 'off the shelf' with minimal customization. The goal is to utilize AI to improve current processes as well, or better, than competitors. As AI is deployed more extensively, in proven ways, the insurer gains an advantage over its competitors.

Case Study 2: Incumbent Expanding Beyond Model

Position: Health insurance and healthcare provider

Insurance provided: Primarily health but also travel and expatriate

Location: UK

Description of the AI Application

Approach to Applying AI

This incumbent expanding beyond their model utilizes technology in new and innovative ways. For example, they provide online health apps and related remote healthcare technology. The app. allows virtual consultations with doctors, and the prescriptions are provided within the app. The insurer provides their services through this app. Their virtual assistant that uses AI is part of their mobile app. There is also a virtual assistant for purchasing health insurance. Consumers can interact with the virtual assistant either by voice or text. The voice assistant can engage with the customer and find solutions for various aspects of the contract, such as premiums and the nature of the coverage.

Specific AI Technologies

AI-driven automation is used in several ways including illness and disability claim prediction, fraud detection, natural language processing during customer service, underwriting; an AI underwriting tool that was trained with machine learning, supports the underwriting of life insurance and offers health advice.

The Underlying Technology

Their app. has an AI-powered clinical triage service. It uses AI to replicate the knowledge and the process a doctor goes through. A virtual doctor can have a conversation with a patient and give advice. The AI can interpret the way patients express their symptoms and identify the problem. The AI can also harness the patient's previous history and any patterns of health problems. Machine learning is used to utilize large databases of health information. The capabilities of machine learning used here are advanced and few companies have currently implemented such sophisticated solutions. Their structured health database, a form of 'knowledge graph,' is another advantage they have in applying AI.

Virtual assistants using natural language processing are increasingly used. Machine learning utilizes the vast volumes of information on their customers' health and how they interact with their services and processes. This information includes text, images, such as scans, but also audio from the call centres. The audio from the call centres helps train the virtual assistant both in the substance of the interaction with the customer and also the style.

Challenges and Regulatory Implications

The health sector is highly regulated and there are many challenges in implementing AI. Even when regulatory challenges are overcome there are risks of legal liability if something goes wrong. It is an important landmark for AI in insurance that AI is used as a virtual doctor, not just to make an analysis to support a human subject expert. Nevertheless, AI is still used mostly for the more typical cases of underwriting and not the more specialised ones. The more innovative implementations of AI, such as it being used in the hiring process, may face challenges from various stakeholders, including the government, unions, and rejected job candidates.

A

The Business Model

This insurer sees that AI gives it an opportunity to make health insurance and healthcare more accessible and convenient. This allows many customers and organizations to use more insurance services. There are synergies between AI and other technology initiatives including wearables, such as fitness trackers. These wearables integrate typical fitness tracking, health insurance services, and encourage and reward a healthier lifestyle. The data and analysis from a breadth of sources, such as wearables, health AI, and doctors, can be brought together to inform insurance decisions and implement insurance.

Virtual assistants improve customer service with the speed they can access data and analyse it. The virtual assistants also increase customer satisfaction in some instances by avoiding human error. As the AI becomes more sophisticated and capable, the benefits increase.

The expected, and partly realised, outcomes are to utilize AI to improve current processes and implement new processes that utilize the new capabilities of AI. This insurer is changing their processes and utilizing AI faster than most large insurers. There seems to be a willingness to change the business model to some degree, not just optimise processes. This health insurer is usually an early adopter of technology, and this also applies to AI. AI influences its processes heavily just like other technologies did in the past.

What is particularly interesting in this case is how the AI from healthcare and the AI in insurance inform one another. This provides an impressive breadth of data and analysis that most insurers cannot match. The benefits of having a business model covering both insurance and health provisions are even greater with AI.

AI supports improved operational efficiency, customer satisfaction, and enables the launch of new services, providing a strategic advantage. This newfound effectiveness can also make expansion possible on a scale that could not have been done before. This expansion can be into new products and services or new geographic locations.

Case Study 3: Dedicated Insurance Disruptor

Position in insurance sector: Mobile based, no physical stores, relatively new, technology-focused insurance company

Insurance provided: Low-cost property and casualty insurance

Location: USA

Description of the AI Application

Approach to Applying AI

This is a new, purely digital insurer, often referred to as 'D2C,' active in several countries, including the USA and the UK. It was 'born digital,' which means it does not have out-dated mind sets or legacy systems. They utilize AI to optimize their processes. Like many internet-based insurers, they rely on a mobile app. with AI automation and vast-diverse amounts of data. Everything is done through the mobile app., so it simplifies the process. The consumer can upload a picture of themselves and enter their vehicle number plate to receive a quote. AI enables the insurer to process the necessary information faster. The mobile app. checks the database of the driver and vehicle licencing agency of each country to identify any problems with the car and the licence. Their system then checks the credit history and criminal record of the customer. Once these quick, automatic checks are made, the insurance is issued.

Their virtual assistant interacts with the consumer during the purchase of a policy, switching from another insurer and claims processing. The processes are very fast and convenient. AI is also used for claims processing and fraud detection. Specific AI technologies identify patterns that indicate fraud. Claims and other processes can be processed faster and more transparently.

This insurer also uses AI and real-time data to increase personalisation and flexibility. This personalization and flexibility is not just at the start when a contract is signed, but throughout as changes can be made where necessary. They also allow the customer to cancel the contract more easily. Making it easier to obtain vehicle insurance and it also benefits casual drivers who borrow someone's car. This functionality can be used by people who do not own a car but want to borrow a friend's car for a few hours.

Specific AI Technologies

AI-driven automation is used in several ways, including selling insurance, estimating risk, evaluating claims, and identifying/preventing fraud.

The Underlying Technology

The virtual assistant can identify the type of claim, the severity, and urgency. Beyond that, it can take steps to encourage the consumer to be truthful and accurate. The well-designed and integrated mobile application takes information directly from the users, but also other data sources to calculate risk. AI supports data sharing and analysis. Currently, the virtual assistant does not reject claims. It processes and settles claims it considers valid automatically and refers the remaining cases to a human to make the final decision. Intelligent analytics keep risks at an acceptable level, while undercutting competitors on price.

As with other internet-based insurers, their success depends on the speed of the quote and being able to offer a low price. AI and machine learning help to achieve this by collecting information from several third-party sources and analysing it to ensure that the lowest price possible is offered while keeping risk at an acceptable level.

The backend processes are highly automated. Many standard and proven solutions are used for its systems, including the AI, with relatively limited customization compared to other insurers that have more highly customized systems.

Challenges and Regulatory Implications

One challenge to success is that as this service is only available through mobile applications, so less technology savvy consumers and those that are not early adopters of technology may not be able to benefit.

Another challenge is that other insurers are using the same technology to offer the same services. By implementing technology systems with limited customisation, they are more dependent on differentiating themselves from similar companies by offering unique services.

A third challenge is that as a new insurer with a relatively new model, processes, staff, and no physical presence, some complicated claims can be challenging to resolve.

The Business Model

As a relatively new, technology-focused insurer, they focus on new technology and automation from the start. Therefore, it is natural for them to use AI as extensively as possible. With a business model that has

limited human involvement on the insurers side, it is easy to be customer-focused. As long as everything is set up to be customer-focused, it will run that way continuously with a consistent service quality. Fast or even instant services and low prices, often far lower than competitors, satisfies most customers.

Furthermore, as they already have an innovative model, they have a culture, operations, and technologies that are open to new approaches. Their business model is already innovative because it does not take a profit from money that is not claimed. They take 20% of the money they receive and the rest either goes to claims or charities. By having a business model that focuses on delivering services that utilize new technologies, this company can utilize these new technologies better than incumbent companies, and create an appealing story and narrative for themselves.

Many casual drivers drive very little, for example, only on the weekends. This means a lower price can be offered to them to insure their cars. For the lower price to be feasible, accurate risk analysis and automation are necessary. Furthermore, as less people own their own cars and may not use them every day, more people want to share their cars. As with other similar small start-ups, the insurance selected by the customer is then underwritten by traditional insurers. Care is taken to collect extensive information from the consumer, but allow them to be in control, so they do not feel that their privacy is violated. The app. utilizes real-time data and the breadth of insurances the consumer selects, to calculate what they call the overall risk the specific person has.

By offering a faster, more convenient service and lower prices, they have an advantage over competitors. They target specific niches and specific insurance services where technology and automation are beneficial, but not all forms of insurance. Their technology focuses on providing customer insurance smoothly with minimal effort. The AI-centric business model is disruptive in how it delivers existing products and services, but new products and services can be added in the future. The business model and fully automated value chain is innovative, while the use of technology is less innovative.

Case Study 4: Tech Company Disruptor

Position: Tech and e-commerce platform entering the insurance sector

Insurance provided: Health, property, international trade, and low-cost life insurance

Location: China

Description of the AI Application

Approach to Applying AI

This is an e-commerce company that leads in implementing technologies, such as AI, big data, and blockchain. It uses AI heavily in healthcare and this is being integrated with new insurance products. It offers insurance through its popular e-commerce, social platforms, and through several online subsidiary insurers. It is a tech-focused B2C and B2B company offering a platform to the user with several insurance providers they partner with. As a platform it is at the centre of a digital ecosystem. As it creates and runs the technology behind the insurance provided, the scalability is easier. Bringing new partners to the market is also easier. Regular events are used to co-develop AI solutions with its partners. Staff from all departments is trained on how to utilize AI so they apply it the way they want and have a culture of continuous learning.

Unlike most implementations of AI in the insurance sector that only enhance the knowledge of the insurer, AI is also implemented here to enhance the knowledge of the customer. This reduces the in-

formation asymmetry, as opposed to increasing it, and helps the customers make the right choices for themselves.

It also innovates in the way that it offers insurance. It allows groups of people to insure themselves together, so that if one falls ill, they take the money the group put in. It can be considered as a form of peer-to-peer insurance or another form of the sharing economy.

Specific AI Technologies

AI is used across this technology giant's e-commerce and social media for analysis, facial recognition, natural language processing, fraud detection, and security. Specific implementations of AI include virtual assistants for customer support, sentiment analysis, and automation of time-consuming and repetitive tasks. Sales and claims processing are done by virtual assistants with a high level of automation. AI is used in the natural language interaction, the analysis, and processing. AI is used to improve the recommendations made to customers. AI supports fully automatic or semi-automatic interactions with consumers using natural language processing and big data. Vast volumes of data are analysed, and the ideal responses are designed for AI to apply. Great care is taken into designing the conversations, so they are beneficial for the consumer. AI is used along with blockchain for smart contracts. This combination of technologies enables some new services, such as insurance for flights. AI is used in a people-centric way. One of the things this means is that AI is used to empower employees rather than replace them.

Technology does not only support the implementation of insurance, but also requires new forms of insurance. Self-driving cars that use AI also need to be insured. There are new opportunities and challenges for insurance created by AI in both current cars that can drive independently, but even more so, for self-driving cars. The new risks they bring must be insured.

The Underlying Technology

This insurer uses the technical infrastructure, payment systems, data, and relationship with customers from its extensive e-commerce operations. It already cross-sells products and services to its existing partners, and this is one more addition. Several partners and their technologies are used, along with some in-house customization, particularly in relation to the interaction with the customer where they have expertise. AI, blockchain, the Internet of Things (IoT), big data, and social media are utilized to understand the user. All of these technologies support integrated seamless services and cross selling to its existing customers.

Challenges and Regulatory Implications

This is a rare case where the regulator encourages innovation and encourages tech companies to enter the insurance sector. The insurance authority of Hong Kong and China encourages technology companies to apply for licences in joint ventures with existing insurers. The use of AI automation, and the use of data from other parts of their business may meet some regulatory challenges. The relationship between healthcare and insurance may raise some regulatory challenges as well. As this technology platform uses AI extensively, and the several partners it has in insurance also use AI extensively, it can be challenging to have a transparent image of how AI and data are used across the many actors involved in providing the insurance. Achieving auditable 'explainability' is more difficult.

The Business Model

This is an organization with extensive capabilities in AI both in terms of the technology such as the algorithms used and the data needed, therefore they are leveraging and re-using existing technological capabilities in adjacent areas. They are strong in several retail areas, such as healthcare, so insurance is a natural addition. Furthermore, engaging in the insurance sector adds one additional source of data.

This insurer's business model is being a platform and a marketplace. The larger it is and the more diverse it is, the better. Their approach can be considered a radical change in an insurance business model, as a tech company is moving into insurance. It already covers most of the value chain in terms of data and technology. This organization's business model, with standardised processes and extensive data, can be considered ideal for AI. This organization aligns its marketing to the capabilities of its systems.

Figure 2. Updated model of five business models in insurance with disruptors split in tech and insurance
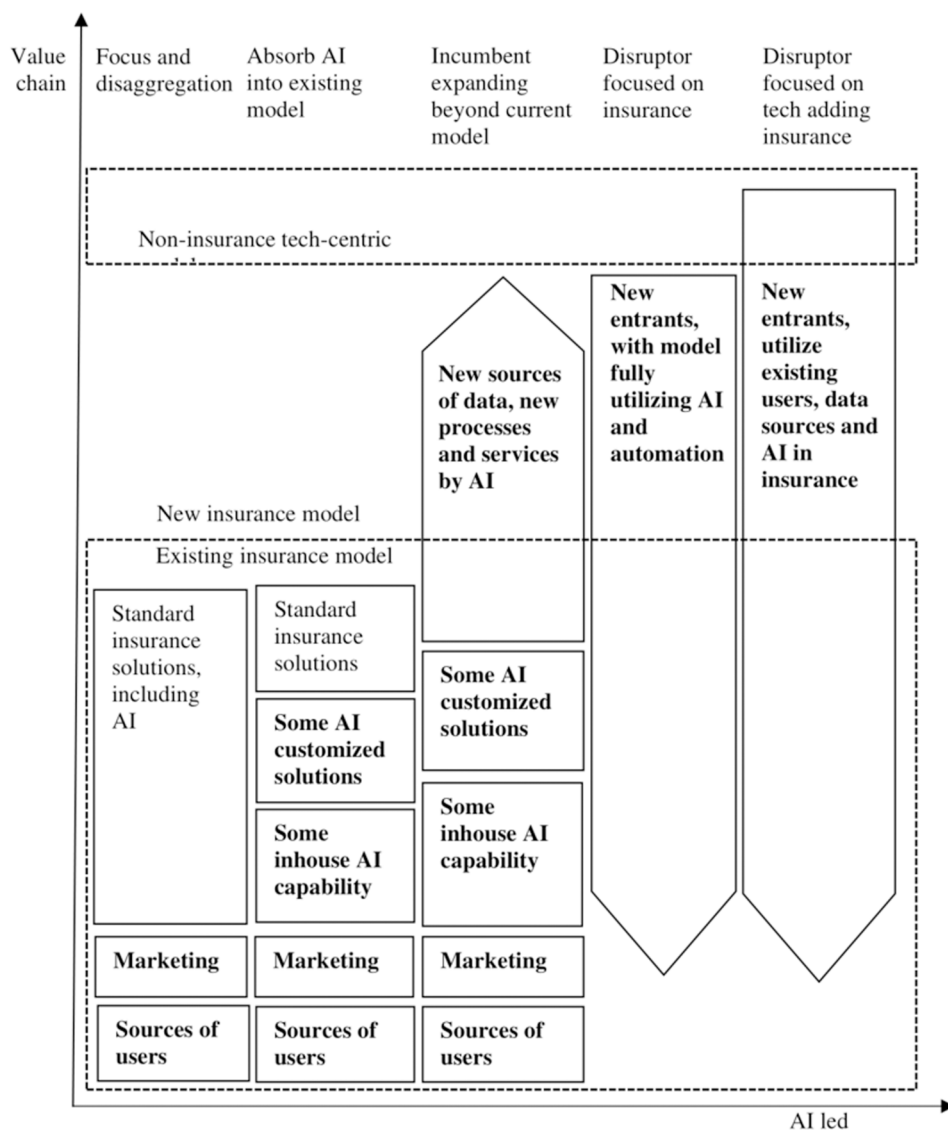
The insurer's strategic logic is to go beyond just being a marketplace and a platform. They want to offer complete, integrated solutions optimised for the cross selling of insurance to existing customers. With the first mover advantage, they also have the opportunity to influence and shape the regulation.

FINDINGS

The impact of AI and data-driven automation in insurance is well underway. While this change shows no signs of stopping or even slowing down, it is at a position in this journey where one can see some business models emerging and being quite well formed and mature. It is therefore a good time to take stock of what has happened. The case studies show the importance of AI and other key technologies in shaping new business models in insurance, just as they have done in other sectors of the economy (Tarafdar et al., 2019). The authors have identified some key technologies and types of companies driving this disruption. The key technologies are: AI, big data, cloud computing, IoT, blockchain, and 5G.

User-facing applications of AI in insurance include: proactive processes and active loss prevention, virtual assistants, chatbots and robo-advisors, fast initial offers and underwriting, faster and more accurate claims processing, improved process flow with clients, new and more flexible services, direct marketing, customer retention, tailored insurance advice, understanding the user's emotions, identifying legal parameters across countries, and AI insuring AI, such as, for example, driverless cars, (Zarifis et al., 2021).

Back-office applications of AI in insurance include: automating simple, low-value tasks, processing large volumes of data, populating and improving data sets, processing structured, semi-structured or unstructured datasets, claims processing, adapting to new risks, new insights on current clients, utilizing data from the IoT, virtual assistants for analysts, fraud detection, faster risk detection for automated services, improved risk analysis, identifying and analysing new data, and audit.

This research attempted to answer the question, "What are the emerging business models in insurance caused by AI and data technologies?" In other words, what the insurance business models were for AI adoption and if they could be empirically validated. This research used a model of four categories of AI adoption in insurance (Zarifis et al., 2019) as a starting point. The preliminary analysis of 15 insurers supported the four categories but identified two useful avenues for further exploration: Firstly, many insurers combined the two first business models. For some products, often the simpler ones, such as car insurance, they focused and disaggregated. For other parts of their organization, they did not change their model, but they absorbed AI into their existing model. Secondly, the fourth category of new entrants has two distinct subgroups: (4a) disruptor focused on insurance and (4b) disruptor focused on tech but adding insurance. The four in-depth case studies support the updated model with five categories, as illustrated in Figure 2.

CONCLUSION

This research evaluated five insurance business models that have a different approach to adopting AI-driven automation in insurance. These cases were chosen primarily because they were representative of the current dynamics, and their clarity of vision is a valuable lesson for others in the sector. This research identified that the digital transformation by AI-driven automation is a long journey, but a clear vision and business model can, and should, be selected at this point. There are several valid business models, as the four cases illustrate, but there are also other insurers with out-dated models that are no longer

fit for purpose. The authors' findings show that now is the time to act and implement a transformation that will lead to an insurer optimised for AI. If insurers wait for AI to be optimised for them, they may become out-dated very quickly. This research makes three contributions:

1. It provides additional empirical support for the four AI and data-driven insurance business models.
2. It illustrates that the fourth category has two distinct subcategories, resulting in a model with the following five categories:
    a. Focus on less insurance services and disaggregation
    b. Absorb AI into existing insurance model
    c. Incumbent insurer expanding beyond model
    d. Dedicated insurance disruptor
    e. Tech company disrupting insurance
3. It identified that the first two categories are often combined, particularly by large insurers with many services.

The main limitations of this research are inherent in the methodology chosen, as four cases were explored in depth so there is a possibility that the findings do not apply fully to other insurers. Future research can further validate and develop the model with other cases from different countries.

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