Artificial Intelligence (AI) and Business Innovation in Insurance: A Comparison of Incumbent Firms versus New Entrants

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Abstract

Artificial Intelligence (AI) systems evolve in response to new data by using adaptive algorithms. The insurance industry is data intensive, and dynamic. It is therefore particularly suitable for AI implementation. An innovation triangle framework is proposed that consists of product, process and value chain innovation. A comparison of leading incumbent insurance firms with new entrants illustrates significant competitive differences. The incumbents apply AI to defend their market positions by enhancing existing strengths and capabilities across the three innovation types. The new entrants exploit AI technology to build new products with innovative features that emphasise customer value and user experience. The innovation triangle is a useful managerial tool to analyse the nature and extent of innovation in insurance and can be used to evaluate and plan AI strategies by mapping existing AI initiatives to specific types of innovation and identifying innovation objectives and opportunities. Future trends and research opportunities are outlined.

Keywords: Artificial Intelligence, insurance, strategy

1. Introduction

There has been considerable interest in the application of Artificial Intelligence (AI) in the insurance market because there appears to be enormous potential for transformation of the existing business models and practices [1]. This is reflected by significant investment in InsurTech globally [2], and a plethora of research reports by leading consultancy firms [3], [4], which are testament to the expected benefits of AI in insurance markets. AI is creating a market discontinuity in many areas of insurance as incumbent firms transform legacy systems, new forms of data are used to assess and price risk, and radically different business models and technical methods are launched, facilitated by novel InsurTech [1].

Business research into AI and big data tends to treat it either as a technical concept or as a black box with new capabilities that can confer business benefits and potentially competitive advantage on those firms that are successful in exploiting AI systems. The result is that there are few examples of actual practice that are written for a managerial audience, i.e., that describes AI applications within specific business contexts and makes sense of them by relating the specific AI technology to business artefacts such as products, processes and customer relationships. It is important to understand the nature of the business changes that are occurring. For this task, the established literature on business innovation provides a useful theoretical framework for analysing the nature and characteristics of business change in insurance markets. Extant research literature from strategy and digital transformation emphasises the role of new entrants and consequent disruptive innovation from digital transformation. However, this neglects the reaction of incumbent firms, who are using digital technology, including AI and big data, to defend their market positions.

The insurance market presents a timely opportunity to evaluate the competitive changes arising from digital disruption. Insurance has arguably lagged other market sectors such as manufacturing, retail banking and e-commerce [5]. This research has two main objectives: to develop and apply an innovation framework that captures the diversity of business innovation and structures these different initiatives into meaningful groups; explore and analyse the innovation and AI strategies of incumbent firms versus new entrants using a theoretical sample of leading incumbent firms and new entrants.

The structure of the paper is as follows: A business innovation framework is developed to capture the nature of the business transformation process in insurance; an analysis of a theoretical sample of three incumbent firms and four new entrants is presented to identify important commonalities and differences in terms of how they strategically apply AI systems; Conclusions are made regarding the trajectory of AI systems in insurance and the key differences in the strategic approaches adopted by incumbent firms and new entrants; The theoretical contribution of the research and the managerial implications are outlined.

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Table 1. Key References to Support the Analytical Framework for Business Innovation

	Theoretical Objectives	Analytical Technique
Product Innovation	Analyses the renewal of the firm from the interaction of firm competencies and product innovation through the separate processes of exploitation of existing resources and exploration of new firm capabilities [10]	Case study research and theoretical analysis of literature
	Impact of technology and demand heterogeneity on product and process innovation	Computer Simulation
	Impact of organizational downsizing on product innovation[11]	Multiple case studies
	Product innovation in tandem with process improvements to enhance the overall business model in the context of dynamic capabilities and strategic leadership[12]	Conceptual
	Continuous product innovation based on customer feedback and the pro-active use of data for exploring new ideas, encouraging the development of new ideas and testing the effectiveness of product innovations[13]	Case study of a single organization
	The role of digital technology in product innovation that identifies the importance of data platforms, distributed innovation and combinatorial innovation, which is a feature of digital technology[14], [15]	Theoretical analysis and secondary data
Process Innovation	Process innovation based on an open strategy approach to encourage further improvements from information sharing[16]	Panel data and longitudinal case research
	Relationship between competitive strategy and innovation and the relationship between production process characteristics and innovation[17]	Systems dynamic Model
	Impact technology and demand heterogeneity on product and process innovation[18]	Computer Simulation
Value Chain Innovation	Smart business networks based on orchestration and flexible economic partnerships to encourage responsiveness in new product design and production flexibility[19]	Case studies of leading smart business networks
	Electronic marketplaces and their likely evolution based on information search theory and transaction cost economics[20]	Strategic analysis based on transaction cost economics
	Direct channel strategy that address the customer directly and disintermediates the traditional insurance broker channel in insurance[21]	Case study of a single organization and channel strategy theory
	Value creation in business-to-business relationships as part of a larger network[22]	Survey research of business organizations

2. Business Innovation

AI and big data are arguably the two most important digital phenomena in insurance [3], [6] [7]. AI and big data should therefore be considered as a system where they are inter-dependent on each other to create a meaningful result. In an insurance context, the AI-big data system exists within a broader business process and Information Systems context. For example, an AI risk assessment application would exist within a risk assessment and management process and would draw data from a range of relevant Information Systems (IS) such as legacy systems for historical claims data and policy information, and newer systems, e.g. GPS and new types of big data that can be used in insurance [8]. When AI is viewed in the context of an AI system that encapsulates big data and the business process or problem context, then it becomes clear that it is a General Purpose Technology (GPT) [9], i.e., it has the potential to transform a whole industry or market, rather than just a specific production technology or innovation.

The business literature on business innovation and technology emphasises the importance of radical change and disruption by new entrants, which are not constrained by existing business models and legacy systems. AI and big data are a continuation of digital transformation that has occurred in waves since the 1950s, and it is argued by influential business commentators and academics alike that AI will have a significantly greater impact than earlier digital technologies [4]. The analytical framework for innovation has three elements: product; process; and value chain innovation. Product and process innovation are long-established themes in the innovation literature [17]. Value chain innovation has been added to capture the important idea from e-commerce that the effects of digital technologies go beyond the organizational boundaries of a single firm and create new possibilities for the structure of market networks, which are an important source of innovation, e.g. smart business networks [19], integrated supply chains [23], electronic marketplaces [24] and new types of search intermediaries such as price comparison engines [25]. In summary, the three types of innovations are: (1) the design, performance and management of insurance *business processes* [26]; (2) the development and implementation of new insurance services from *product innovation* [27]; and (3) innovation in the *value chain configuration* of insurance markets that is related to the customer journey concept from a customer perspective [2] and the channel strategy of insurance companies.

A sample of authoritative research into the three types of business innovation is presented in Table 1.

2.1 Product Innovation

Examples of product innovation include behavioural insurance that utilise telematics in automotive insurance and fitness trackers in health insurance; parametric insurance that pays out automatically on the satisfaction of pre-defined rules or limits such as missed or late flights, movement in stock indices and currencies and extreme weather; usage-based insurance for gig-economy workers such as taxi drivers and Airbnb hosts; and novel insurance for new areas such as cyber-insurance. Many of the innovations in insurance over the past 10 years have exploited a combination of digital technology (Internet of Things, telematics, sensors) and AI (machine learning, Robotic Process Automation RPA, Natural Language Processing NLP, image recognition, predictive analytics, and data. Insurance is an information-based product, where the market is in the maturity stage of the product lifecycle. Therefore, non-technology improvements based on legacy business models tend to be incremental in nature and to build on existing products, processes and use traditional data sources. By observation it is obvious that most, if not all of the current slew of innovations in insurance are made possible by new kinds of big data combined with AI technology and enabled by cheap, ubiquitous computing [2]. A focus on new forms of big data is therefore appropriate to explore the link between data and product innovation [28].

2.2 Process Innovation

Business processes are the set of activities involved in achieving a business goal or objective and produce an output such as service to an external customer or an internal organizational function. The key processes in an insurance firm based on practice from systems design [29] are: policy administration; product-market development; underwriting; risk and compliance; customer management; and claims processing. Innovation in business processes include increased automation, redesign and simplification of business processes and related legacy systems, novel techniques and processes to assess risk, new forms of e-service from apps and AI-powered call centres, and new methodologies for testing new product ideas. Process innovation may lead to or form a critical part of product innovation. For example, innovations in the e-service process form part of the overall product offer to customers or may make the insurance service easier to use thereby enhancing the product and the customer perceived value. Developments in analytics processes are also an integral component in behavioural-based insurance products.

2.3 Value Chain Innovation

Value chain innovation in insurance is the reconfiguration of relationships throughout the insurance value chain, e.g., price comparison websites, data platforms and direct channel strategies [30]. Price comparison websites revolutionized the distribution of consumer insurance products, and more sophisticated AI comparison websites supported will enable more complex comparisons of product features, in addition to price. Two key attributes of price comparison tools are the ease of use and time-saving benefits that they offer to consumers, which are often overlooked because of the emphasis on lower prices.

The big data revolution is concerned with new types of data from a range of different sources: IoT; smart watches; sensors; telematics; smart buildings; and satellite imagery [8]. The initial research into big data focused on defining its key features, e.g. the 5Vs of volume, velocity, variety, veracity and value [31], the analytics potential of big data [32], and the importance of data granularity at scale. Looking beyond the technical attributes of big data [33], the emergence of data platforms and related value chain networks [30] will have a significant competitive impact on the insurance market because they will define the control over the collection, storage, access, use and evolution of data within and potentially across market sectors. McKinsey argues that platform business models consisting of buyers and sellers will account for 30% of revenue by 2025 [33] and makes the important point that all of the major technology companies, including Google, Microsoft, Alibaba, Uber and Amazon operate platform business models. I

In markets such as Germany where brokers still play a significant role in the distribution of insurance, a new kind of insurance company, Lemonade, has launched and focused on two key areas: bypassing the broker to address the consumer directly and ease of use. The principal innovation here is channel strategy where Lemonade is using ecommerce and mobile technology to connect directly to individuals in the consumer market, in much the same way that Direct Line used the telephone and intensive television advertising in the 1980s [21].

2.4 Incumbent Competitors versus New Entrants

In addition to examining the *nature* of business innovation, the competitive position of the insurance companies, incumbent or new entrant, is also important because the strategies, nature of innovation and use of technology is likely to be different between these two groups. Incumbent firms typically focus on defending their market positions. New entrants tend to attack and

Table 2. Theoretical Case Sample of Incumbent Firms and New Entrants

Competitive Position and Company Examples.		Business Innovation		
		Business Processes	**Product**	**Insurance Value Chain Configuration**
Incumbent Insurance Firms	AXA*	***Strategic enhancement and automation of legacy systems and processes***	Improvements in product performance, e.g., claims and e-service	Not applicable
	Comparethemarket*	Sophisticated customer journey and e-service processes	The price comparison tool for new customer acquisition and e-service emphasises user interface design for ease of use and speed of operation	***Value-chain disruptor through price comparison website***
	HUK-COBURG*	Interactive communication with customers to improve driving performance	***Behavioural automotive insurance and new forms of big data***	Not applicable
New Entrants	WeCovr	Ease of use in customer-facing processes	*Product innovation based on personal insurance folder*	***Value-chain disruptor through data platform that connects a set of insurance firms directly with consumers through a data platform that is organised around the customer***
	By Miles*	Risk mitigation through dynamic communication with customers	***Product innovation and use of behavioural data***	Partnership arrangement with incumbent for underwriting and direct marketing to consumers
	Lemonade	Ease of use, speed and convenience based on AI chatbots for new customer acquisition and claims	***Product simplification based on an AI data flywheel and social giving are the defining characteristics of the product offer***	Value chain disruptor through direct channel strategy
	Cuvva	Focus on mobile platforms to simplify the customer acquisition process	***Product innovation is based on short-term and flexible cover, to disrupt the standard annual cycle for automotive insurance***	Direct marketing to a specific market segment through mobile, digital first strategy

N.B. * denotes primary data collection

disrupt markets. This categorization is important because new entrants differ from incumbent firms in terms of strategic perspective [34] and innovation strategies [35].

Incumbents defend their market positions by improving existing business models whilst also experimenting with new product innovation and technologies [36], [37]. [35] focuses on new entrants that disrupt the status quo in a marketplace. In insurance markets, the concept of a digital start-up, which is the archetypal new entrant, needs to be carefully considered because there are different ways of entering the market. The most ambitious type of new entrant is a firm that enters as a new insurance company, i.e., it offers an insurance service, registers as an insurance company and therefore is obliged to comply with and operate within a stringent regulatory framework and must overcome marketing barriers to entry against large and established insurance companies. The capital and technology skills required to create a brand-new insurance firm are such that only a handful are likely to emerge and those that do are therefore important and should be studied closely.

3. Methodology and Case Data

The rationale for the theoretical case sample is shown in Table 2. N The theoretical sample is designed to capture each type of innovation. The incumbent firms were chosen as exemplars in each of the different types of business innovation. AXA is a market leader and is typical of an established, broad-based insurance firm. It is using AI technology to strengthen its existing business model and protect is market position, especially through automation of a wide range of internal and customer-facing business processes [38], [39]. Comparethemarket.com is the UK market leader in price comparison websites, which have disrupted the insurance value chain and also other market sectors such as energy and health, which makes it a multi-sided insurance platform [40]. HUK-COBURG is a leading consumer insurance company that has embraced telematics and behavioural insurance in the automotive sector with its use of new forms of big data and risk-based pricing that is based on driving performance. See Tables 3 and 4 for an overview of the case data.

Table 3. Incumbent Firms Case Data

Theoretical construct / Company	Market Position and Strategy	Digital technology, AI and Big Data	Business Innovation	*Case discussion*
AXA	*AXA is a market leader in consumer and business markets that is using a variety of AI and digital technologies to defend its strong market position across a wide range of insurance lines.*	*The principal data challenge it faces is to effectively manage the vast number and types of documents that are used in its systems, most of which contains unstructured information. AXA is implementing a range of AI applications: Robotic Process Automation (RPA) in policy administration; simple Natural Language Processing (NLP) to extract and classify unstructured data; complex NLP for risk engineering and smart contract management; image recognition in claims management; and machine learning for fraud detection.*	*The emphasis is on improving and augmenting the performance of the existing business model. Automation of existing processes is leading to significant productivity gains and cost savings. Analysis of unstructured data from NLP applications generates management insights from legacy systems and support the development of new risk engineering solutions and smart contract management capabilities.*	*The focus of AXA's AI strategy is to significantly improve its internal business processes, which creates administrative cost savings, reduction in the rate of fraudulent claims, and product enhancement through faster performance and easier to use services. The overall business model remains the same.*
CTM	*Comparethemarket is the leading price comparison website in the UK and is part of the international BGL Group which also has operations in France and South Africa. It entered the insurance market as a disruptor and has continued to adopt this mindset with its adoption and implementation of new technology, including AI, in many aspects of its business model.*	*Comparethemarket is implementing machine learning in several areas of its business to improve customer journey design and to provide highly relevant content to its customers. Two important aspects of the customer user experience that can be improved with AI are simplification of the customer journey and personalization of information content.*	*Comparethemarket is using digital technology and AI to continually improve the effectiveness of its price comparison services that give consumers a fast and efficient method to compare products and prices from a wide range of providers. Customer journeys are evaluated for user experience and their effectiveness in providing the customer with an efficient and feature-rich experience.*	*Comparethemarket is the UK market leader in the price comparison space and focuses on the distribution segment of the value chain. It is using AI to improve customer-facing processes through a combination of simplifying the customer journey and personalizing content to individual customers.*
HUK COBURG	*HUK-COBURG is the leading home and automotive company in Germany. It is embracing new forms of big data to implement behavioural insurance in the automotive sector, which means that it is offering both traditional and behavioural automotive insurance in parallel.*	*GPS, mobile phone data and potentially engine management data, weather data, and collective information from road authorities and the network of customers create a rich data set that is used to calculate an objective evaluation of a driver's ability and expected safety, which is used to determine a risk-based and use-based pricing strategy.*	*Behavioural insurance uses driving data instead of traditional data such as age and experience. Risk is treated as a dynamic variable and drivers are encouraged to improve their driving safety through active feedback that explains their driving score in a manner that can be understood by general, non-technical customers.*	*Behavioural insurance creates expertise so that the company can respond quickly if the market grows. This blocking strategy impedes new entrants and improves the retention of existing customers. The business innovation stems from a new product, and business processes that capture, organise, and interpret new forms of big data. The innovation creates customer value in terms of flexibility, risk reduction and price advantages for careful drivers.*

Table 4. New Entrants Case Data

Theoretical Construct / Company	Market Position and Strategy	Digital Technology, AI and Big Data	Business Innovation	Case Discussion
WeCovr	*WeCovr is an insurance platform that combines personal and business insurance products from a variety of insurance firms in a single app and offers a range of products including home, pet, car and commercial. The design of the app creates a smooth and fast user interface.*	*WeCovr offers insurance via turnkey APIs, mobile app and web. The digital technology is characterised by smart user design and supported by a big data platform. Re-engineering of the buying process is a key feature of the offer.*	*The business innovation is focused on a user interface that creates an easy-to-use online customer journey. The innovations are the search and buying processes, and an insurance data platform rather than the products themselves. The differentiation is the convenience and ease of use.*	*WeCovr offers numerous insurance products via turnkey APIs, mobile and web app to simplify the customer experience. It has also started forming partnerships which enables insurers to cross-sell insurance.*
By Miles	*By Miles is the UK's first real-time pay-per-mile car insurance provider. It entered the insurance market as a disruptor focusing on product innovation using new forms of big data from a vehicle's engine management system and GPS driver data. It has partnered with AXA for the underwriting and uses its app to market directly to customers who value the flexibility of pay per journey.*	*The By Miles app is used to acquire new customers and deliver the insurance service, with automated pricing information for each journey. The AI system is an algorithm that analyses the vehicle telematics information from the engine management system and GPS data to calculate route data, distance, and driving behaviour characteristics. Pricing and risk information are based on driving behaviour and historical loss data from the whole customer base.*	*By Miles is a new entrant that offers a brand-new type of behavioural and pay-per-use car insurance service. The product innovation is underpinned by a range of business process innovation, including new customer acquisition, driver behaviour analytics, pricing and claims management.*	*ByMiles enjoys a first mover advantage in the UK for real-time pay-per-mile insurance. It focuses on product innovation and customer-facing processes and partners with AXA for back-office systems and underwriting. The natural curiosity of customers for new products helps its marketing and the partnership with AXA overcomes the regulatory hurdles for new entrants.*
Lemonade	*Lemonade is an InsurTech disruptor that deals directly with the customer. Its target market segment is young customers who value the use of technology to reduce the friction involved in buying insurance products. It applies AI throughout its business model, adopts an ethical position and shares its profits with charities.*	*AI is used for: Customer eXperience (CX); pricing and underwriting; and claims management. AI Maya is a virtual assistant that provides quotes and handles payments. AI Jim handles FNOL for 96% of claims and 1/3 of cases are managed with no human involvement. The AI bots are work by themselves and are supported by staff.*	*Lemonade has re-engineered every aspect of the customer journey with automated AI-enabled 'bots' that can handle a significant proportion of customer queries, claims, and routine policy amendments. The AI systems and process-reengineering enable Lemonade to address customers directly.*	*A combination of product and channel innovation disrupts the market. Its strategy is a data-first perspective with an emphasis on world-class user experience. The pricing and underwriting capability was developed through the AI data flywheel effect and aggressive pricing. AI is used to refine and segment customers and for cross-selling.*
Cuvva	*Cuvva entered as a disruptor targeting customers that require short term car insurance. It is the UK's first insurer to offer car insurance by the hour, which is marketed directly through mobile applications. All aspects of the motor insurance product lifecycle, i.e., search, buy and e-service, are managed through the mobile platform through a 24/7 customer support system.*	*Via Cuvva's iOS and Android mobile app, customers can purchase short-term insurance within minutes. Cuvva's platform addresses the customer directly and does not require brokers or other search intermediaries, which reduces affinity marketing costs and makes what is initially a niche product economically viable.*	*Time-based insurance service that covers very short periods of time ranging from a few hours to a few days is a key feature of insurance, e.g., temporary car insurance; learner insurance for a minimum of just one hour; and 'pay as you go' insurance.*	*Cuvva has a first mover advantage in the UK with its flexible short-term insurance. Its focus on product innovation is complemented with an innovative interface, efficient product set up and sophisticated e-service. Insurance covers takes less than one minute to arrange.*

Table 5. AI Systems and Business Innovation by Incumbent Firms

AI Systems	Business Innovation
Automation of simple and repetitive tasks through Robotic Process Automation (RPA)	Increased efficiency of routine business processes associated with legacy systems
Replacement of human operators in call centre operations through the advanced use of voice recognition, Natural Language Processing (NLP) and insurance ontology conversation frameworks	Process efficiency and product enhancement through faster customer services
Online chat in ecommerce systems using conversation bots that are trained on very large data sets	Process efficiency and enhanced customer experience
e-service through web browsers and mobile applications supported by Chatbots	Process efficiency to reduce the cost to serve and improve availability and timeliness of e-service
Enhanced capabilities in risk analysis and pricing of new policies from the application of machine learning to model broad and large data sets that relate the characteristics of the insured asset to possible outcomes in terms of the frequency and magnitude of claims	Improved assessment of risk and fast, dynamic pricing for customers
Sophisticated market segmentation based on clustering analysis using machine learning techniques of diverse customer data, including online search behaviour, demographics, policy history, claims history, social network data and interactions between the insurer and the customer captured in CRM systems	Marketing process effectiveness from improved allocation of sales and advertising campaigns
Identification of fraudulent claims	Loss reduction from improved claims management
Automated regulatory compliance in both an active manner, i.e. to intervene in contentious decisions, and in reporting historical compliance	Administrative efficiency from better regulatory processes
Launch of behavioural insurance	Behavioural insurance product

4. Case Discussion

The case discussion is structured around cross-case analysis for each group, incumbent insurance firms and new entrants, followed by some general observations.

4.1 Incumbent Insurance Firms

The incumbent firms are using AI to defend market positions by improving their existing business models. A synthesis of the AI systems is shown in Table 5. The improvement of business processes generates simple efficiency benefits and improves process effectiveness, e.g., improved pricing from machine learning, fewer fraudulent claims, and better user experience. The incumbents' market strategies are characterised as AI augmentation business models to defend strong market positions. HUK-COBURG's behavioural insurance product blocks new entrants by making it more difficult for them to gain a foothold in the market, and prepares the company for future market scenarios. Comparethemarket is using AI for product innovation with an emphasis on user experience, e.g., improved customer service from automated search and e-service capabilities, speed and time savings for the customer, and ease of use. Its AI strategy is to enhance and augment its current business model.

AXA is using AI to improve all aspects of its existing business model, i.e. the focus is on strategic enhancement rather than radical change [41], [42]. It is doing this through a combination of automation of business processes, [43], such as e-service, fraud detection and smart contract management. Improvements in business process performance also leads to improved product performance, e.g. faster customer service from improved e-service in areas such as claims and new business applications [38]. AXA is also a research pioneer in areas such as predictive analytics and ethical use of AI systems.

New entrants that exploit AI and big data pose an existential threat to incumbents, but these examples demonstrate that the market leaders have been proactive in adopting AI systems in a defensive capacity to both improve their legacy systems and processes, and to include new product features that exploit AI capabilities. They have developed strategic alliances with AI start-ups that seek to partner with existing competitors, e.g. see the wide range of FinTech companies that target insurance companies, as well as banks and e-commerce [44]. The partnerships between incumbents and AI start-ups have the potential to combine small company innovation and technology leadership with large company scale and distribution.

4.2 New Entrants

The new entrants have a broader range of business innovation, because they are focusing on how to exploit AI to develop new and different types of insurance.

Cuvva and By Miles are good examples of using product innovation to disrupt the status quo through time flexibility, and novel usage patterns. All three types of value chain configuration are included with Comparethemarket (price comparison website), WeCovr (data platform) and Lemonade (direct channel strategy). These companies all create value through their interactions with customers. These high-profile new entrants all offer insurance services directly to customers, and apply AI technology throughout the customer journey. High-quality e-service encourages customer retention. Well-designed user-interfaces reduce administrative costs and help make the business models more profitable.

Strong product innovation is a feature of the new entrants: WeCovr offers an easy-to-use bundled service that exploits a data platform; By Miles offers a pay-per-use behavioural insurance product; Lemonade is positioned as an ethical insurance firm that shares its profits with customers' charities; and Cuvva is focusing on product innovation by offering short-term insurance cover, which is largely neglected in the traditional annual-cycle automotive and home insurance markets. To establish a foothold in the insurance markets, the new entrants all have clear market segmentation strategies that focus on under-served segments, e.g., young car drivers, and customers who are early adopters of new technology and who value AI product innovations.

WeCovr's data platform changes the way that providers offer their products through an intermediary in an integrated manner that enhances the customer experience and reduces the amount of time to manage the insurance documentation and policies. WeCovr uses the data platform to encourage affiliate marketing to increase its market reach. By Miles addresses its customers directly because its insurance service is not sufficiently standardised to be offered on a price comparison website, and it uses a partnership with an established insurance firm to manage the underwriting process and overcome the regulatory barriers to entry. Lemonade is attacking markets where the retail brokers and intermediaries are strongest through intensive online marketing, coupled with a sophisticated interface that gives confidence to customers to buy directly without advice from an insurance broker. Cuvva also uses a hi-tech user interface to create a full self-service offering and have a direct relationship with customers. The AI systems and business innovations for new entrants are shown in Table 6.

Table 6. AI Systems and Business Innovation by New Entrants

I Systems	Business Innovation
AI chatbot for new customer acquisition	Easy access to information and products and services to purchase
AI chatbot for claims management	Channel disruption with straightforward resolution of claims through automated insurance estimates and instant payment
AI chatbot for e-service requests	E-service process innovation that can also facilitate channel disruption by facilitating direct marketing of insurance
Behavioural driving risk assessment and pricing	Disruptive product innovation based on sophisticated data analytics
Pay-per-use insurance supported by AI to manage vehicle telematics and driver data	Product innovation through flexible short time-period insurance
Data platform for different types of insurance	Critical mass of customers and insurance providers in a single location, i.e. a data platform that acts as an electronic market
E-service vaults	Process innovation reducing cost to serve
AI market segmentation	Targeted marketing with tailored product offerings for each market segment

Bain & Company's survey of 655 InsurTech companies found that only 3% are insurance carriers. The bulk are technology firms that partner with incumbents and a relatively small number are creating new platforms and marketplaces. Partnerships between AI start-ups & incumbent firm accounts for the majority of innovation. New entrants use AI for product innovation and engineer services specifically for digital channels. AI systems create new process capabilities, which are used to develop novel products and services, in conjunction with re-configuration of the insurance value chain.

4.3 General Observations

All the AI applications are examples of narrow AI because they address a specific, self-contained problem with a clearly defined objective, and this is typical of AI in insurance applications. This is in sharp contrast to the notion of general intelligence. Lemonade's leading-edge user interface that saves time and effort needed by customers to search, buy and use the product. WeCovr focuses on user experience, and bundles insurance services from a range of suppliers on a single platform for convenience. The nature of the innovation is focused exclusively on user experience: ease of use; speed;

convenience; and administrative efficiency, delivered through a mobile application [45]. Behavioural insurance has the potential to disrupt health, buildings, cyber and automotive insurance and requires new forms of big data. Big data and data platforms are likely to change the competitive landscape of insurance, leading to new forms of insurance ecosystems and strategic partnerships [46].

5. Conclusions

Insurance is inherently an information product, which means that the digital transformation of insurance markets is inevitable – the research questions and managerial problems are therefore concerned with how AI, big data and digital technology will transform markets, and what are the likely emerging patterns of innovation in AI strategies and business models? The cross-case analysis reveals that all the AI systems were applied in narrowly defined insurance business processes. This empirical observation is important because it indicates that AI is at an early stage of maturity. These AI silos are likely to develop into organisation-wide systems, similar to Enterprise Resource Planning (ERP) systems.

Access to AI technology is very good for digitally advanced companies – the competitive battle is about access to relevant data. The shift towards behavioural insurance is therefore an opportunity for new entrants because historical insurance information is much less valuable where new forms of big data and AI are required. The concepts of data platforms and ecosystems are strategically important, especially if the data platforms are owned and managed by non-insurance firms such as automotive, construction and health companies.

The business innovation framework is based on the well-established concepts of product and process innovation. The new framework integrates value chain configuration to create a more general model. Based on a theoretical sample of incumbents and new entrants, it is shown that new entrants focus on attacking insurance markets with an emphasis on product and value chain disruption whereas incumbent firms use AI technology to augment existing business models, in parallel with novel applications such as behavioural insurance. The dynamics of the innovation process can be simplified into the following hypothesis: AI systems create new process capabilities in narrow business activities such as pricing, risk assessment and claims management. Processes with enhanced capabilities support and create new products and enable new types of value chain configuration. Product innovation is not limited to the attributes of the product itself, but also the user interface that determines the way in which the product is searched out, bought, and used. The user interface designs for new customer acquisition, sale and e-service are therefore an area for competitive differentiation.

Future research will explore the nature of business innovation in incumbent firms versus new entrants through more extensive survey research, and through highly detailed individual case studies that address the implementation of business innovation and AI systems.

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