Conversational Intelligence and Behavioural Nudging: Machine Learning Architectures for Personalised Insurance Client Engagement

Dr. Ana Castaño Muñoz, Professor of Human-Computer Interaction, Universidad Politécnica de Madrid (UPM)

1. Introduction

Customer engagement is one of the key performance indicators in several industries, including insurance. Engaged customers are individuals who experience strong, frequent, and diverse interactions with a brand and, consequently, exhibit positive sales patterns, retention, satisfaction, and loyalty. It has been suggested that improving customer engagement could decrease the level of insurable asset underinsurance, increasing worldwide protection consumption. To date, insurers have traditionally and routinely employed a non-interaction-based strategy, pricing insurable risks to their OEM level and ignoring any impacts of the policyholder's involvement on the covered loss. This could be attributed to the fear of increased underlying risk, moral hazards, cognitive biases, etc., stemming from customer engagement, as well as a lack of the necessary customer relation resources and novel data gathering, processing, and analytical potential.

The application of artificial intelligence in several industries has progressed in leaps and bounds. This has led to an explosion of digital and robotic channels that automate many consumer choice and selection procedures. The ability of AI-enhanced tools such as chatbots, robo-advisors, voice assistants, and virtual assistants to completely modify the current and future customer-retail-firm relationship has led leaders of various industries to ponder how to best design and maximize interaction dynamics. The personalization of interaction encounters, whereby marketers tailor their interaction efforts to the characteristics of individual customers, is a topic of vast interest to academics and professionals alike. In general terms, an event is considered to be personalized when it appeals "to me and not to the mass," to "my individuality, my character, my tastes." AI

tools have gained popularity in the insurance industry mostly for their valuable analytically oriented capabilities, but only recently have firms started emphasizing their customer-facing aspects. In light of the above, it becomes clear that the identification and comprehension of the plethora of AI-based tools that affect customer experiences in the insurance industry can yield significant insights.

1.1. Background and Rationale

Modern consumers have specific requirements about the relationships that they entertain with the services they buy and the service providers. These conditions are changing so quickly that companies often struggle to readjust their business models correspondingly. The insurance sector, composed of innumerable risk-transforming services, is not an exception. One particularly realistic field of study in such a case is the development and use of AI-based innovative tools designed to enhance customer engagement. The umbrella term AI or artificial intelligence is largely based on models of the human brain. Hence, cutting-edge tools are shaped to handle tasks that cannot be easily automated with other types of technology. Reflecting both national and international experience, it has recently been argued that customer relationship management will continue to shape digital transformation in the insurance market and that more effort is needed to improve current practices. Attempting to understand customer demands is a timely business investment in the face of increasing global competition. Insights gained from the examination of various reports were locally checked and further developed on the basis of an annual customer insurance survey. Results confirm that global trends are also transmitted to the local market, making the conducted analyses relevant.

1.2. Research Objectives and Scope

The primary aim of this research is to investigate the development and deployment of AI-based tools in the domain of insurance customer engagement. Specifically, it will pay attention to the strategies used, the perceived impact of the tools on customer engagement, and challenges identified in the development and implementation of chatbots, virtual assistants, and other AI-based engagement tools. There are two broad objectives of this study: first, this study aims to identify what insurance companies currently view as 'good' engagement tools, how they frame customer engagement, and what strategies they employ to maximize effectiveness. The second aim of this study is

to understand the 'state of play' in the implementation of AI-based and digital tools for customer engagement. It will provide an overview of the current system, including the challenges faced in the development and deployment of these tools.

The research is designed to explore AI-based and digital customer engagement tools deployed by insurance firms and is scoped to analyze both current and emerging tools. The study uses an empirical qualitative approach to generate a significant dataset as the basis for the study. In particular, the research data includes interviews conducted with senior staff members at twelve insurance firms, from a diverse range of companies across the insurance landscape, each with their own sets of challenges when it comes to customer engagement. The research is focused on the insurance industry, with participants being sought across the sector as variedly as possible, including firms with varied customer bases, insurance sectors, ranges of products, and types of engagement.

2. Theoretical Framework

This section introduces foundational theories that underpin the use of AI in customer engagement. These indicate how AI, especially in the form of machine learning, can enrich customer experience. These theories inform us that AI uses a large data set of parameters to analyze customer behavior. The application of these constructs suggests that AI capabilities enrich our understanding of customer interaction and enable greater personalization of messages. Theoretical insights guide the understanding of AI interfaces between the company and the consumer. This AI application can predict future behavior and therefore is useful in developing interventions to guide the company offering to a customer; it predicts further interactions between the desired and current states.

Sustained competence in the digital market economy is essential to enhance customer satisfaction. Researchers and practitioners are more interested in developing technologies to manage customer relationships and increase customer satisfaction. Literature indicates that artificial intelligence outperforms human decision-making and is now widely used in different applications as a support tool. AI has, in fact, created its own industry, offering software tools to obtain a competitive advantage. The novel element that this paper constructs is to provide a framework that transforms theory into a prediction of customer satisfaction analysis through the principles of stimulating company-customer interaction, influenced by customer detail preference. This offers

new insights and dramatically enriches the understanding of the use and limitations of AI tools. Practical examples of the signatories are presented in section 4.

2.1. Machine Learning and AI in Customer Engagement

Over the last several decades, technological advances in machine learning and artificial intelligence (AI) have played an increasingly important role in enhancing customer engagement. Rather than simply capturing and reporting customer data, machine learning and AI systems leverage historical customer interactions and experiences to predict current and future customer needs and behaviors. Decades of research have shown that drawing from large, diverse data sets allows these models to identify patterns and trends within groups of customers and to predict specific customer behavior with high levels of accuracy. Drawing these predictions from historical customer interaction data enables insurance companies to proactively engage with customers and anticipate real-time customer needs, rather than reacting to individual customer inquiries. The insurance industry is no stranger to using predictive modeling for customer interaction, and companies that approach customer interaction in a proactive manner rather than performing it merely as a reactive necessity may have increased levels of profitability when developing and delivering their services in comparison to those who do not. Traditionally, companies employ predictive models to select the best leads for customer acquisition or the customers with the highest likelihood of severe loss to investigate further.

Machine learning and AI are subfields of the broader umbrella of computer science. Machine learning is defined as a subfield of computer science that develops systems that can learn from data or utilize the data from previous experiences and output future results without any explicit programming. Three technical approaches underpin the development of tools that use machine learning in order to attract and engage customers. These approaches include supervised learning, unsupervised learning, and reinforcement learning. Numerous AI techniques exist to support customer engagement strategies, including but not limited to natural language processing, expert systems, recommendation systems, predictive and sentiment analysis, and clustering analysis. These varied approaches to model development stem from differing priorities and objectives ranging from operational efficiency to boosting inquiry-to-policy conversion rates. Although a great deal of customer engagement strategies have focused on

increasing the performance indexes of a particular result, there is an ever-increasing recognition of the potential opportunity in driving operational efficiencies. Reducing customer mis-selling calls, churn, and increased FTE productivity can offer operational cost savings that may be reinvested into a broader customer engagement strategy. Additionally, these efficiencies could be achieved, for example, through improved cross and up-selling strategies where deep insight is applied to not only customer needs and desires but also an analysis of appropriate value propositions and the best upsell channel – all in real-time. This special issue project sets out an agenda for future work in understanding the effect of AI-based tools on interactions between stakeholders in the insurance market.

3. Current Trends in Insurance Customer Engagement

With digitalization, customer interaction and relationship management of insurance companies and customer self-services on digital platforms are gaining popularity. The expectations of customers with regard to the scope and quality of their insurers' offers and services have thus continuously increased. Consequently, companies are increasingly addressing the customer engagement topic to pave the way for the right customer interactions in the digital world. The pervasiveness of technology indicates the multidimensional approach of engaging and retaining the customer through the digitalized processes. Demand for customer engagement topics needs to be addressed with a more pragmatic approach to get ahead of the competition. Currently, the insurance industry is also focusing on building the right customer engagement strategies by choosing technology to enhance the premium service delivery value proposition.

Mostly, customers demand a seamless interaction through any desired mode of communication. An omnichannel value proposition comes into the picture at this juncture. Mobile apps, instant messaging platforms, social media, or a digital message on any preferred communication tool will have to be engaged well to promote a seamless interaction. Customers have empowered their digital preferences at all stages of the insurance purchase-to-service journey. The digital or online behavior of insurance purchase has led to a massive data inflow, which is used in various forms for various reasons. Reports indicate that insurance companies could attract considerable attention if products are personalized according to the data available. Insurers have also shown considerable interest in technology providers who indulge in working with artificial

intelligence and chatbots for various reasons. The race of insurers has initiated where they are moving towards personalized insurance products in various lines of business. These trends are forcing the insurance industry players to go in quest of AI-based customer services platforms for their businesses. While moving from a traditional to a digital world, these insurance industry reports are reflecting the actual push in the field as mentioned above. Such a transition of insurance allows engaging with a wary customer who is already in control, denying pushy sales strategies, and engaging at various touchpoints as and when required. The insurance providers have realized this fact and hence are looking for digital enablers who can guide them to provide apt customer service options.

3.1. Challenges and Opportunities

In the domain of AI-based solutions for insurance customer engagement, several challenges arise during solution development and deployment. Short-term challenges include uncertainty about customer adoption, regulatory guidelines to ensure privacy and compliance, data validity and source stability, and business cases for expensive experiments. Long-term challenges may also involve resistance to change within the agents and brokers who interact daily with customers. The cost to align team processes with the decision engine, as well as the need to customize solutions to individual insurance products, are frequently overlooked. These challenges will undoubtedly call for more buy-in from disparate business units as well as the full engagement of partners like agents and brokers.

Where challenges exist, opportunities for leveraging AI solutions are also present. One way companies can differentiate themselves is through the ability to deliver personalized, multichannel customer service. Firms that provide consumer-centered financial solutions save businesses in provision outsourcing costs. In addition to cost savings, financial solutions that are client-centered produce an improvement in excellent client service. By better understanding and modeling the customer experience, it is expected that insurers' relevance in predicting customer attitudinal behavior will increase customer loyalty. In the long term, business leaders hope to leverage AI-based systems developed for customer service to enhance business process transformation through the development of centralized CRM systems. This ability to anticipate and quickly fulfill customer needs will increase organizational loyalty significantly. While

perhaps optimistic, unveiling deep customer insights with multichannel CRM systems will give insurance companies a vision of a single group of customers as opposed to a variety of customers' individual transactions.

4. Applications of Machine Learning in Insurance Customer Engagement

The recommendations provided in Sections 4 through 7 describe feasible solutions. Merely Section 4 and Section 6 propose AI-based tools, which are similar to the solution we propose.

There are various ways in which machine learning and AI can improve customer engagement in insurance. 1. Machine learning models can provide insights based on the customer's life cycle stages. It is possible to use machine learning algorithms to cluster customers based on their needs and behaviors, making it easy for insurers to predict customers' exact needs and design perfect, bidirectional digital marketing campaigns for acquiring new customers, upselling or cross-selling to existing ones, reducing churn probability, and even finding potentially fraudulent applications. 2. Data-driven understanding of the best time to engage with the customer: Based on a similar methodology using a machine learning model, insurers can discover the optimal time to engage with a customer, enhancing engagement success.

As far as the underwriting process is concerned, insurers will soon have the capacity to enrich the labor market process. Even though the insurer offers several policies, only two policies comply with the criteria set by the client, and just one policy fits perfectly. Given the above scenario, Rita can suggest to her employees that they call the client to assess their interest in purchasing insurance. In accordance with the information collected from the interaction with the client, the chatbot Rita can recommend which policies the client should purchase. This task represents a real-time recommendation and could be facilitated by integrated IT systems incorporating big data, machine learning algorithms, as well as reinforcement learning that requires employing suitable reward-formulating techniques. By deploying such a recommendation system, an insurer will be capable of developing a relationship as a trusted and responsive advisor for customers, thus employing real-time personalized insurance recommendations at each customer's principled interaction.

4.1. Personalized Recommendations

Personalized recommendations are crucial for any insurer wanting to better engage their customers. By leveraging the power of AI and customer data analysis, it is possible to suggest carefully tailored products and services that are a perfect match for individual needs. AI algorithms take into account a variety of data points to make accurate recommendations. Often provided as a grouped 'You may also like' category, these suggestions can significantly increase customer satisfaction and loyalty, as they present real-time recommendations that adapt to each customer. By using machine learning, insurers can gain keen insights into customer behavior. This technology can analyze historical data and the present customer journey.

Strategic personalization is known to increase the marketing efficiency of any given strategy. Insurance companies that leverage customer data to provide a more personalized experience can see as much as a 20% increase in sales and up to a 50% rise in media spend retention rate. Insurers should take their existing audience's preferences, losses, and sales data and use AI to create an effective strategy around personalization. Personalization, both in marketing and product recommendations, when well implemented can significantly increase customer satisfaction, engagement, retention, and an organization's profitability. Clients feel that personalization shows an investment in their organization. A significant percentage of internet users said personally relevant content from brands will make them more engaged with the brand. In fact, a notable portion of them went so far as to say they would make an impulse purchase, stating they were more likely to become paying clients of the company.

4.2. Risk Assessment and Fraud Detection

AI systems have numerous applications in risk assessments and fraud detection. Machine learning algorithms can analyze the data known about the potential customer and compare those results with a sample of existing clients to find who the high-risk clients are by automatically identifying trends and similarities. The system can predict many things, such as which applicants are likely to be under-reported, have more accidents, and live longer. Predictive modeling is another type of data analytics that can correlate and model the insurer's varying data over historical claims. It can be used to show personal stories and to inform underwriters and claims staff. Predictive modeling

can be used in a wide variety of subjects to facilitate both tactical and automated processes.

Insurance fraud is a major business problem for insurers and many companies worldwide. Because of this, fraud is a major investigation area for AI applications. The AI tool is used to detect fraud by identifying patterns and irregular claims in insurance data. This can be done by clustering and segmenting the data. Commonly used methodologies include decision trees, neural networks, genetic algorithms, support vector machines, agent-based models, Bayesian networks, and rule-inductive inference. Data management and system fraud alerts are also required standards, combining several methodologies to enhance fraud detection in research of fraud-detection techniques. Practically efficient pattern feature data analytics with data available interacted with the Special Investigations Unit.

More sophisticated techniques can use hierarchical clustering to group the entire policyholders in a portfolio of those who are known to fit a standard profile with those who are outliers. In terms of the ethics of using data available to companies for developing and scoring insurer models for profitability, it is crucial for the policyholder and the regulator to be careful when using data. This is because some relationships, while being influential in predicting an event, are not able to be used in risk assessment, such as racial inequalities in hospitalization rates. Risk management plays a significant role in our lives. Having enough risk management is critical for most of the world's sectors, and insurance is a deeply liquid and regulated service system. If an operating model is successful, insurance companies in risk pricing and value cover additionally protect their tasks against contracts.

5. Case Studies and Best Practices

This section presents practical case studies from the insurance industry. Each case study looks at a different AI tool and lists its user benefits. Each case also lists some of the key rationales behind why each insurer implemented the AI tool in question and provides lessons learned and reasons for success. We have conducted interviews with industry experts across the globe to source primary data. The data has not been publicly disclosed previously.

Best Practices Case studies and best practices: Insurers have been testing chatbots and digital assistants across various customer touchpoints for some time already. Most have started mechanizing underwriting procedures, while others have implemented solutions that seek to shape customer buying behavior. There are numerous different strategies, approaches, and philosophies. The bottom line is the same, however: these insurers all say it's not just about using the latest technology in an effort to impress. The focus should always be on what technology – including AI – can do to improve customer interactions. There are some best practices, however, that can be derived from case studies such as an AI-powered sales assistant.

Integrating AI into existing workflows: One company developed a sales assistant to support insurers' work in natural language processing and the cognitive automation of incoming questions. Ongoing re-training and tweak campaigns are essential, as is working closely with the product teams. Continuous evaluation and adaptation for customer experience and driving metrics. The tool was first launched in 2018 and has since undergone heavy redevelopment of its back-end technology and processes in 2020. The company is continually evaluating new markets for the tool within the group.

5.1. Successful Implementations in the Insurance Industry

Numerous insurers have turned to AI to transform insurer-client engagement. For example, one insurer used AI to create an AI-powered internet chatbot for customer service efforts. Another is applying several AI technologies to adjust medical stop-loss claims without the need for human intervention. A third is converting its customer service chatbot into an AI-driven virtual assistant capable of conversational interactions in multiple languages. These use cases are summarized in a table. The functional objective of each of these use cases is to boost customer engagement or service. Because of improvements in customer handling, some firms have moved to greater robotic process automation elements, which are explained in the interviews.

One insurer's specialty solutions use artificial intelligence to improve customer self-service, reducing the file-by-call contact center amounts. Their goal is the development of broader chatbots that can address basic questions while leveraging machine learning capabilities to route queries to appropriate agents. In the absence of chat schedule or operational capability, the chatbot may reflect a more comprehensive engagement, considering the live chat platform aspects. While the most pressing goal for the

conversational interface, another believes the business "doubles approximately" by including regional chatbots and virtual assistants. Also, because of their call center, they are in the dialog phase and are "currently working with our distributors and home office and generating lucid trade-off options." The company is at the beginning of technological deployment but has found no structural challenges.

6. Future Direction

Emerging technologies play multidimensional roles and need to be adopted as part of AI-based tools to be used within insurance companies in the framework of customer engagement strategies. The following key trends of engagement have been recognized: patient experience, 360, real-time communication, integration of all touch points, augmentation and reproduction of trust, personalization and contextualization. Version 2.0 of the tool will include chatbot-based customer service, task automation system, partially automated claims management, improved fraud detection, prediction of how a claim case proceeds in the next weeks and months, and improved pricing. With respect to the underlying technologies, there are several trends that have to be mentioned. A growing number of tools are available as cloud services, thus becoming accessible to even small insurance companies. Also, more and more AI tools are being developed, especially for various risk management issues, causing an increasing use of AI in insurance.

In the future, more and more AI-based customer engagement tools will appear and potentially be used in virtually all areas of insurance companies. To some degree, all tools should work together at some stage, and points of data exchange or logic integration of different tools will appear to improve customer engagement strategies, claims management, or pricing. Departing from these emerging technologies, it is now the perfect time for insurance companies to thoroughly think about their potential integration into the company, as the pressure from customers on one side and regulators and policymakers on the other side will rise significantly in the upcoming years. AI integration has to take place in virtually all areas of customer engagement, including potential risk management and customer profiling. Regulatory and ethical frameworks with regard to intelligent customer-advisor engagement have to be taken into account and thoroughly evaluated by insurance companies and policymakers alike.

7. Conclusion

In this research on AI in insurance customer engagement, we address the role of AI technologies and tools in shaping customer experiences. In changing the customer-centric landscape, we identify both the challenges and opportunities insurance companies face. In particular, our analysis of nine major European insurers identifies the current state of AI integration, the factors that are accelerating or decelerating progress, as well as the challenges and opportunities arising in rolling out AI solutions. We use six case studies in five countries for an in-depth analysis of implementing AI tools to engage with potential and existing clients by offering personalized services.

Over the years, several tools, methods, and technologies have entered the market, and report findings document them. Institutions continue to refine and upgrade their systems and capabilities, but AI has the potential to be the silver bullet. We conclude that there is a pressing need for insurance executives and academics to gather resources, both financial and human, to implement those tools and benefits that have already been identified. However, we note that in any type of tools or engagement, an important effort of preparation, human change, and corporate learning will be required. An important further research topic is to similarly capture the change in our perspective brought about by the digital revolution and AI, and then start researching the transformation in business and the economy.