Impact of AI in the General Insurance underwriting factors

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ABSTRACT

The paper discusses the impact of artificial intelligence (AI) on the insurance underwriting process, highlighting the benefits of predictive analytics in better understanding risk and providing real-time data for quotes on demand. The use of AI algorithms in underwriting can help underwriters to focus on more complex and strategic aspects of their work while automating tedious underwriting tasks.

The paper presents the AI Based Risk Intelligence Model (RIM), which combines data analytics, machine learning algorithms, and predictive modelling to provide a comprehensive view of an insurer's risk exposure. The RIM consists of four key components: Data Collection and Integration, Risk Analysis and Assessment, Predictive Modelling and Scenario Analysis, and Risk Management and Monitoring.

The RIM is a valuable tool for improving overall risk management in the industry, enabling insurers to identify and manage risks more effectively and make informed underwriting decisions. The model provides a comprehensive analysis of risk factors beyond traditional methods of risk assessment, such as age, gender, and occupation and habits, taking into account a wide range of variables, such as lifestyle choices, health behaviours, and environmental factors.

Implementing appropriate model with the use of AI the insurers can accurately assess moral and morale hazards and determine an appropriate strategy for their clients. This can result in the better risk assessment and more accurate pricing for insurance products and can also help insurers to identify reinsurance arrangements. The RIM can be customized to meet the specific needs of different insurers and can be a valuable tool for improving overall risk management in the industry.

Keywords: Risk Management, Risk Assessment, Artificial Intelligence, Machine Learning, Deep Learning, Underwriting, Risk Intelligence, Predictive modelling.

1 Introduction

The insurance underwriting process is being revolutionized by the use of artificial intelligence (AI), which is increasing its efficiency and accuracy. One of the key benefits of AI is its ability to utilize predictive analytics to better understand risk and provide real-time data for quotes on demand. This allows insurers to customize policies for each customer's needs, resulting in a more personalized and effective approach to underwriting.

One of the main advantages of using AI in underwriting is that it can analyze large volumes of data more quickly and accurately than humans. This means that underwriters can focus on strategy and portfolio management rather than spending time scrutinizing data manually. AI algorithms can perform tedious underwriting tasks more efficiently, freeing up underwriters to focus on more complex and strategic aspects of their work.

In some cases, a combination of AI applications is used to arrive at a more effective underwriting plan. This can involve using different types of AI algorithms to analyze different aspects of the data, or combining AI with other technologies such as machine learning or natural language processing. The result is a formidable underwriting plan that can more accurately predict risk and tailor policies to individual customers' needs.

AI is also helping insurers to identify potentially fraudulent claims more quickly and accurately. This is because AI algorithms can analyze vast amounts of data to identify patterns and anomalies that may indicate fraud, such as multiple claims for the same injury or a sudden increase in claims from a particular geographic region. By detecting fraud more quickly, insurers can save money and protect themselves against false claims.

Another advantage of using AI in underwriting is that it can speed up the overall underwriting process. This is because AI can quickly evaluate potential customers to determine their risk, using data from a range of sources including social media, credit reports, and public records. By automating this process, insurers can reduce the time it takes to underwrite policies, making the process faster and more efficient for both customers and insurers.
Overall, AI is transforming the insurance underwriting process by increasing efficiency, accuracy, and personalization. By utilizing predictive analytics, detecting fraud more quickly, and automating tedious tasks, AI is allowing underwriters to focus on more strategic aspects of their work and provide a better experience for customers. As the use of AI in underwriting continues to grow, we can expect to see further improvements in the speed, accuracy, and effectiveness of the underwriting process.

2 Literature review:

This literature review aims to explore the impact of AI in the underwriting factors of general insurance by examining various studies conducted in this field.

Increased Efficiency

AI has the potential to increase efficiency in the underwriting process by automating tedious tasks and reducing the time it takes to underwrite policies. According to a study by Accenture, AI can improve the underwriting process by up to 90%, resulting in faster and more efficient policies (Accenture, 2019). The use of AI algorithms to analyze vast amounts of data can also reduce the time it takes to evaluate potential customers’ risk and determine their premiums (Allianz, 2021).

Improved Accuracy

AI can significantly improve the accuracy of the underwriting process by using predictive analytics to better understand risk. According to a study by McKinsey & Company, the use of AI can reduce errors in underwriting by up to 90% (McKinsey & Company, 2020). By analyzing data from various sources, including social media and credit reports, AI algorithms can more accurately predict potential losses and tailor policies to individual customers’ needs.

Personalization

AI can provide a more personalized approach to underwriting by analyzing data on individual customers to customize policies for their specific needs. According to a study by Capgemini, 75% of insurance customers are willing to share their data with insurers if it results in personalized policies (Capgemini, 2020). The use of AI can also improve customer experience by providing real-time data for quotes on demand and automating the claims process (Allianz, 2021).

Detection of Fraud

AI can detect fraudulent claims more quickly and accurately by analyzing vast amounts of data to identify patterns and anomalies. According to a study by Cognizant, AI can detect fraudulent claims with up to 98% accuracy (Cognizant, 2020). By detecting fraud more quickly, insurers can save money and protect themselves against false claims.

Challenges

The use of AI in underwriting also poses certain challenges. One of the main challenges is the lack of transparency in AI algorithms, which can make it difficult to explain the reasoning behind certain decisions (Deloitte, 2018). Another challenge is the need for large amounts of data to train AI algorithms, which can be costly and time-consuming (McKinsey & Company, 2020). Additionally, there is a risk that the use of AI could lead to discrimination if algorithms are biased towards certain groups (Deloitte, 2018).

The use of artificial intelligence (AI) in the insurance industry has been rapidly gaining traction in recent years, particularly in the area of underwriting. Indian researchers have contributed to the growing body of literature on this topic, with several papers exploring the impact of AI on underwriting factors of general insurance.

One study by Chauhan and Narang (2021) reviews the use of machine learning algorithms, such as decision trees, random forests, and neural networks, in insurance underwriting. Similarly, Singh and Agrawal (2021) review the application of AI in various areas of insurance, including underwriting, claims management, and fraud detection.

Kar and Sharma (2020) also examine the use of AI in the insurance industry, with a focus on underwriting, risk assessment, and fraud detection. Gupta and Bhatnagar (2020) specifically review the role of AI in underwriting in the Indian insurance industry, highlighting both the benefits and challenges of its implementation.
Saini and Sharma (2020) provide a more comprehensive review of the use of AI in underwriting in the insurance industry, including its potential benefits and challenges. Bhandari and Chawla (2019) examine the impact of AI on the Indian insurance industry more broadly, with a focus on the benefits and challenges of using AI in underwriting. Ravi and Chandrasekharan (2019) delve deeper into the use of machine learning in underwriting of general insurance policies in India, while Mohapatra and Mohanty (2019) review the use of AI in various areas of insurance, including underwriting, claims management, and fraud detection.

Singh (2018) provides an overview of AI and its applications in the insurance industry in India, including its potential impact on underwriting. Finally, Chakraborty and Bhattacharya (2018) review the impact of AI on insurance underwriting in India, highlighting the benefits and challenges of its implementation.

Overall, these studies demonstrate the growing interest in the use of AI in underwriting in the Indian insurance industry, as well as the potential benefits and challenges of its implementation. They provide valuable insights for insurance companies looking to leverage AI to improve their underwriting processes and better serve their customers.

The AI applications in General Insurance

Artificial intelligence (AI) has significantly disrupted the insurance industry in the last few years - especially in the retail and specialty lines. AI-driven underwriting has helped companies escape the operational and financial bottlenecks associated with manual underwriting.

However, commercial insurance has seen limited AI adoption in the underwriting function - most commercial insurance providers deploy underwriting experts that deploy unique and non-standard processes to forecast the potential profitability against risk and the right parameters for making a quote.

AI-driven underwriting analyses a risk profile in the purview of evolving geopolitical risks, more extensive ecosystem variables, social media sentiments, Geospatial Information Systems (GIS), and real-time data from IoT networks/3rd parties to appropriately appraise premiums while also accounting for retention conditions and customer delight within the pricing strategy. Most commercial lines have seen success with predictive ML solutions in rolling out fairly-priced quotes fast and achieving higher profitability through their pricing strategy.

The role of AI in various segments

Fire insurance: AI can be used in fire insurance to predict the risk of fire in a particular area by analyzing data such as weather patterns, historical fire incidents, and other relevant factors. This information can help insurance companies to determine appropriate premiums and reduce the risk of losses.

Engineering insurance: AI can be used in engineering insurance to detect and prevent equipment failures or other issues that could lead to claims. For example, sensors can be installed on machines to monitor their performance, and AI algorithms can analyze the data to detect potential issues before they cause a problem.

Marine insurance: AI can be used in marine insurance to improve safety and reduce the risk of losses. For example, AI can be used to monitor vessels in real-time, track weather conditions, and predict potential hazards. This information can help insurance companies to adjust premiums and take other measures to reduce the risk of losses.

Liability insurance: AI can be used to analyze data from various sources to help assess liability risks more accurately. For example, AI algorithms can analyze social media and other public data to identify potential red flags related to a person’s behavior or activities. This can help insurers to assess the risk of claims and detect fraudulent activity.

Machinery insurance risk assessment: AI can be used to monitor and analyze data from sensors installed on machinery to detect potential issues before they cause a problem. This can help insurers to assess the risk of losses and adjust premiums accordingly. For example, if a sensor detects abnormal vibrations in a machine, an AI algorithm can analyze the data and alert the insurer to potential risks.

Claims processing: AI can be used to process claims more quickly and accurately. For example, AI algorithms can analyze data from multiple sources, such as medical records, accident reports, and other relevant data, to help determine the validity of a claim and assess the appropriate amount of compensation.

Over the past few years, the insurance industry has been significantly disrupted by the adoption of artificial intelligence (AI), especially in the retail and specialty lines. Manual underwriting has been replaced by AI-driven underwriting, which has helped companies overcome operational and financial bottlenecks associated with traditional underwriting methods. However, the adoption of AI in the underwriting function of commercial
insurance has been limited. This is mainly due to the fact that most commercial insurance providers still rely on underwriting experts who use unique and non-standard processes to forecast potential profitability against risk and determine the appropriate parameters for making a quote.

In contrast, AI-driven underwriting in commercial insurance analyses a risk profile using a range of data sources, including evolving geopolitical risks, wider ecosystem variables, social media sentiments, Geospatial Information Systems (GIS), and real-time data from IoT networks and third-party providers. This approach enables insurers to appropriately appraise premiums while accounting for retention conditions and customer satisfaction within the pricing strategy. Predictive machine learning (ML) solutions have been successful in rolling out fairly-priced quotes quickly, which has led to higher profitability through effective pricing strategies.

![Fig: 1 The application flow of AI in the General Insurance](image)

AI has an essential role to play in different segments of the insurance industry. In fire insurance, AI can predict the risk of fire in a particular area by analyzing data such as weather patterns, historical fire incidents, and other relevant factors. This information can help insurance companies determine appropriate premiums and reduce the risk of losses.

In engineering insurance, AI can be used to detect and prevent equipment failures or other issues that could lead to claims. For example, sensors can be installed on machines to monitor their performance, and AI algorithms can analyze the data to detect potential issues before they cause a problem.

In marine insurance, AI can improve safety and reduce the risk of losses by monitoring vessels in real-time, tracking weather conditions, and predicting potential hazards. This information can help insurance companies adjust premiums and take other measures to reduce the risk of losses.

AI can also be used to analyze data from various sources to help assess liability risks more accurately in liability insurance. For example, AI algorithms can analyze social media and other public data to identify potential red flags related to a person’s behavior or activities. This can help insurers assess the risk of claims and detect fraudulent activity.

In machinery insurance risk assessment, AI can be used to monitor and analyze data from sensors installed on machinery to detect potential issues before they cause a problem. This can help insurers assess the risk of losses and adjust premiums accordingly. For example, if a sensor detects abnormal vibrations in a machine, an AI algorithm can analyze the data and alert the insurer to potential risks.

AI can be used to process claims more quickly and accurately. AI algorithms can analyze data from multiple sources, such as medical records, accident reports, and other relevant data, to help determine the validity of a claim and assess the appropriate amount of compensation.
AI-driven underwriting and related technologies have revolutionized the insurance industry, and insurers that do not adopt these tools risk falling behind their competitors in the highly competitive and constantly evolving insurance market.

3 Objectives of the study:

- To examine the extent of AI adoption in underwriting within the general insurance industry and identify the factors that have influenced its adoption.
- To analyze the impact of AI in improving the efficiency and accuracy of underwriting factors such as risk assessment, pricing strategy, and customer satisfaction in the general insurance sector.
- To recommend best practices for implementing AI in underwriting processes for general insurance providers to improve underwriting efficiency, enhance risk management, and provide better customer experience.
- To develop an integrated model to help insurers to better understand their risk exposure, make informed underwriting decisions, and comply with regulatory requirements.

4 Research Methodology:

This study used secondary sources of information to develop a model, A through literature review conducted to identify and gather relevant secondary sources of information. These sources include academic journals, books, industry reports, publications, and online databases. The researcher has evaluated the reliability, validity, and relevance of each source of information and selected the most appropriate ones to be used in the model development.

After identification of patterns and trends and considering various factors, a model has been developed. This process involved organizing the information, categorizing it into relevant themes, and developing a framework for the model.

This study would help other researchers to replicate and build on my work in the future. By following this research methodology, I would ensure that my research is systematic, rigorous, and credible, and the model developed is valid, reliable, and relevant to the research objectives.

Model Development

This paper develops a comprehensive Risk Intelligence model to measure underwriting efficiency for the Indian non-life insurance industry. In the underwriting approach, insurers are treated as institutions whose functions are to provide various products and services to their policyholders by engaging in risk reduction through pooling. Insurance companies collect premiums from their policyholders and redistribute most of the funds to those clients who sustain losses. In the process, firms incur various actuarial, underwriting, and related expenses in operating the risk pool and providing loss settlement services. This approach is appropriate for assessing insurers' ability to satisfy claims brought by policyholders.

The Indian non-life insurance industry is a dynamic sector that requires insurers to effectively manage their operations and provide quality services to their policyholders. Underwriting, which involves assessing and pricing risk, is a critical function in the insurance industry. It enables insurers to accurately determine the premiums to charge their policyholders and the risks they are willing to accept.

To measure underwriting efficiency in the Indian non-life insurance industry, this paper proposes a comprehensive model that considers various factors, including actuarial, underwriting, and related expenses. The model treats insurance companies as institutions that provide a range of products and services to their policyholders by pooling and redistributing funds. The model also considers the firms' ability to settle claims brought by policyholders.

Insurance companies collect premiums from their policyholders and use the funds to cover losses sustained by their clients. In the process, they incur various expenses related to operating the risk pool and providing loss settlement services. The proposed model considers these expenses as a measure of underwriting efficiency.

The proposed model can help insurers in the Indian non-life insurance industry to identify areas of improvement and optimize their operations. By assessing the efficiency of their underwriting processes, insurers can determine the areas where they need to focus their resources to improve their profitability and competitiveness.

Risk Intelligence Model (RIM)
The Risk Intelligence Model is designed to help general insurance companies to better assess and manage risks. The model combines data analytics, machine learning algorithms, and predictive modeling to provide a comprehensive view of an insurer's risk exposure. It also considers the insurer's business strategy, risk appetite, and regulatory compliance requirements.

The study has four key components which are Data Collection and Integration, Risk Analysis and Assessment, Predictive Modeling and Scenario Analysis, Risk Management and Monitoring. The diagram for the Risk Intelligence Model is provided in Fig. 2. Further, corporate strategic actions can pose physical risks to the business, employees, customers, and the environment. It is essential for companies to consider and mitigate these risks to ensure the well-being of their employees, customers, and the environment. The systematic analysis of strategic risk is depicted in Fig. 3.

Fig. 2: The Risk Intelligence Model (Developed by the researcher)

Fig. 3: Systematic analysis of strategic risk

Fig. 3 Explains the possible risk associated with the corporate strategic actions and resilience to the dynamic risks as an outcome of the actions.
Data Collection and Integration: The model collects data from multiple sources, including historical data, third-party data, and real-time data. The data is then integrated into a single platform, making it easier to analyze and interpret.

Risk Analysis and Assessment: The model uses machine learning algorithms to analyze the data and identify patterns and trends. It assesses the insurer’s risk exposure across different lines of business, geographies, and customer segments.

Predictive Modeling and Scenario Analysis: The model uses predictive modeling to forecast potential risks and losses. It also conducts scenario analysis to simulate the impact of various events, such as natural disasters or economic downturns, on the insurer’s portfolio.

Risk Management and Monitoring: The model provides real-time monitoring and reporting of risks. It also offers recommendations on risk mitigation strategies and helps insurers to comply with regulatory requirements.

Corporate actions and decisions may present several risks for companies. These risks can include financial risks such as increased debt, decreased cash flow, and reduced profitability. Physical risk possibility like workplace accidents, machinery breakdown, explosion, fire and other hazards. Additionally, there can be operational risks such as disruption of business operations and loss of key personnel. In the current dynamic business environment, companies must be resilient to these risks. Resilience can be achieved through risk assessment and management, effective communication, agile decision-making, and contingency planning. It is also important for companies to maintain strong relationships with stakeholders, including customers, employees, and investors, to mitigate the impact of potential risks and apply suitable tools like scenario analysis to mitigate the risks.

By using the Risk Intelligence Model, general insurance companies can improve their risk assessment capabilities and make better underwriting decisions. The model enables insurers to identify and manage risks more effectively, reducing the likelihood of losses and improving the profitability of the business.

The unique outcomes of the Risk Intelligence Model

This model provides a comprehensive analysis of risk factors beyond traditional methods of risk assessment, such as age, gender, and occupation and habits. The RIM takes into account a wide range of variables such as lifestyle choices, health behaviors, and environmental factors, which can greatly impact the likelihood of an insurance claim being made and in general insurance it predicts the moral hazard aspects which is really difficult in traditional way.

The insurance company can use this model to price two customer differently as per their habits, carelessness, having concern approach and can have a leap in the competitive pricing.

This can also help in using AI algorithms to create predictive models that can estimate the likelihood of a policyholder making a claim. These models can take into account a wide range of variables, such as past claims history, driving behavior, and credit scores, to help insurers determine appropriate premiums.

By using the Risk Intelligence Model, insurers can more accurately assess moral and morale hazards and determine appropriate strategy for their clients. This can result in more accurate pricing for insurance policies and can also help insurers to identify reinsurance arrangements.

The proposed tools suggested by the researcher in Risk Intelligence Modelling

FMEA (Failure Mode and Effects Analysis): This tool is used to identify potential failures in a system, process, or product and their effects on the overall performance. It is used to identify potential risks and prioritize them based on their severity. An insurance company might use FMEA to assess potential risks in its claims processing system. The company could identify potential failures such as lost documents, data entry errors, or processing delays. By prioritizing these risks based on their severity, the company can take steps to mitigate the most critical risks and reduce the likelihood of these failures occurring.
HAZOP (Hazard and Operability Study): This is a structured and systematic approach to identifying hazards and operability issues in a process or system. It involves a team of experts reviewing the process or system to identify potential deviations from the intended operation. The underwriter might use HAZOP to assess the risks associated with insuring a particular industry or business. The company could gather a team of experts to review the operations of the industry or business and identify potential hazards or operational issues. By addressing these risks, the company can better understand the potential losses and adjust its insurance policies and pricing accordingly.

Fault Tree Analysis (FTA): This tool is used to identify and analyze the potential causes of a specific event or failure. It involves creating a graphical representation of the failure and identifying the potential causes leading up to it. For example, in the case of a car accident claim, the company could use FTA to identify the potential causes of the accident, such as driver error, vehicle malfunction, or road conditions. By identifying these causes, the company can determine which claims are the most likely to occur and adjust its underwriting policies and pricing accordingly.

Event Tree Analysis (ETA): This tool is used to identify the possible outcomes of a specific event or failure. It involves creating a graphical representation of the event and identifying the potential consequences and outcomes. The insurance company could use ETA to assess the potential impacts of a natural disaster on its policyholders. By identifying the potential consequences and outcomes, the company can better understand its exposure and prepare its response accordingly.

Bowtie Analysis: This tool is used to visualize the relationships between hazards, causes, and consequences. It involves creating a bowtie-shaped diagram to show the potential causes of a specific hazard and the consequences that may result. The company could use Bowtie Analysis to visualize the potential hazards, causes, and consequences associated with insuring a particular type of business. It helps to identify proximate cause and moral hazard aspects.

Quantitative Risk Assessment (QRA): This tool is used to quantify the potential risks and their impacts. It involves assigning numerical values to the likelihood and consequences of a risk event and calculating the overall risk level. The Insurance company could use QRA to assess the potential losses associated with a cyber attack on its computer systems. By quantifying the potential losses, the company can better understand its exposure and adjust its risk management strategies accordingly.

The proposed model provides a comprehensive approach to measuring underwriting efficiency in the Indian non-life insurance industry. It considers various factors related to insurers’ operations, enabling them to identify areas of improvement and optimize their operations. The model can be used by insurers to assess their ability to provide quality services to their policyholders, manage risks effectively, and remain competitive in the market.

5 Conclusion:

In conclusion, the insurance underwriting process is being transformed by the adoption of artificial intelligence (AI), which is improving efficiency, accuracy, and personalization. The use of predictive analytics helps insurers better understand risk and provide real-time data for quotes on demand. The benefits of AI include the ability to analyze vast amounts of data more quickly and accurately than humans, identify potentially fraudulent claims more quickly, and speed up the overall underwriting process. AI is also being used in various segments of the insurance industry, including fire, engineering, marine, and liability insurance, to predict risk, prevent losses, improve safety, and assess liability risks more accurately. However, there are challenges associated with AI-driven underwriting, including issues related to data privacy and ethics. To improve underwriting efficiency, enhance risk management, and provide better customer experience, general insurance providers should adopt best practices for implementing AI in their underwriting processes. The research methodology for this paper involves the development of a comprehensive Risk Intelligence model to measure underwriting efficiency for the Indian non-life insurance industry, which involves assessing and pricing risk, providing loss settlement services, and managing operations effectively. The model helps assess insurers’ ability to satisfy claims brought by policyholders, which is critical in the insurance industry. Overall, AI-driven underwriting and related technologies have revolutionized the insurance industry, and insurers that do not adopt these tools risk falling behind their competitors in the highly competitive and constantly evolving insurance market.
References: