MARAI – MATURITY ASSESSMENT READINESS INDEX FOR AI IN

INSURANCE

by

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DISSERTATION

Presented to the Swiss School of Business and Management Geneva

In Partial Fulfillment

Of the Requirements

For the Degree

DOCTOR OF BUSINESS ADMINISTRATION

SWISS SCHOOL OF BUSINESS AND MANAGEMENT GENEVA

MARCH,2024

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Dedication

To My family and my children for their continues support on providing me space and time to focus on this adventure.

Acknowledgements

Thanks for my mentor Dr.Kamal Malik for continues support, review and guidance for this research.

ABSTRACT

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Prasanna Venkatesh Jayaprakash
2024

The Insurance industry, one of the oldest sectors globally, has always been at the forefront
of adopting new technologies to enhance its operations and services. This industry,
encompassing life, property, and casualty insurance, operates through various departments
such as actuarial management, customer and broker management, and both front and back-
office operations. Recently, there has been a significant shift towards integrating Artificial
Intelligence (AI) into these operations, driven by the broader trend of digital transformation
in business processes.

Gartner, in its analysis of strategic technology trends, highlighted AI engineering as a
pivotal development (Panetta, 2021). AI's disruptive potential is evident in its
advancements in vision, speech, and text processing, attracting substantial investments
from tech giants like Google, Microsoft, IBM, Amazon, and Facebook. The insurance
industry, in its quest for innovation and efficiency, has leveraged AI to reimagine

traditional business models and operational strategies. Despite these advancements, there lacks a benchmark or standard index to gauge the maturity of AI implementation within insurance companies.

This research focuses on the utilization of AI within the insurance sector, examining its impact on operational processes, identify gap faced by the industry when it comes to implementing AI in various departments within Insurance companies.

The insurance sector, traditionally reliant on extensive data and complex processes, has seen AI catalyze significant changes. Technologies such as machine learning, natural language processing, and predictive analytics have introduced new efficiencies in underwriting, claims processing, and customer service, thereby enhancing accuracy, customer engagement, and operational efficiency. As AI technology evolves, its influence on the insurance industry is expected to expand, presenting both opportunities and challenges.

The research study addressed various domains critical in assessing an insurance organization's maturity in AI integration: Enterprise Management and Leadership, Governance and Strategy, Technology, and Business Process, with a focus on Operations. It will evaluate alignment in management, strategy, governance, digital capabilities, automation, data strategy, and support services, highlighting areas for improvement and suggesting pathways for leveraging AI to navigate the rapidly changing landscape of the insurance industry effectively.

As an outcome of the research this thesis proposes MARAI Framework (Maturity assessment readiness Index for AI in Insurance) with the focus on enabling Insurance companies to access their current state of the AI maturity in their operation and proposes areas to focus on based on their strategic implementation timeline. The same can be used by the insurance companies to address AI solution implementation across their value chain.

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CHAPTER I

INTRODUCTION

1.1 Introduction

Insurance industry being one of the oldest industries in the world focused on risk mitigation spanning across Life, property & casualty insurance. Insurance company operations comprises of various departments including Actuarial management, front office and back-office operations, customer, and broker management etc. In the recent time insurance industry is in forefront on latest technology adaption and new filed of InsureTech is on rise.

Gartner on their top strategic technology trend mentioned AI engineering as one of the Top trends (Panetta, 2021) . Artificial intelligence being one of the top disruptive technologies among various latest technology development and advancement in vision, speech and text processing. Prominent technological Giants like google, Microsoft, IBM, Amazon, facebook etc., have invested heavily to advance the AI technology development of AI to the another level.

Insurance industry is in forefront to adapt latest Artificial Intelligence techniques to advance their offerings, current techniques also help to build innovative insurance business model to deliver the services.

In the Insurance Industry there is no benchmark / standard index to understand the depth of the AI implementation and its involvement in insurance companies. The research is

focused on use of AI in Insurance industry and its impact of various aspect of the insurance company operations, business model innovation and also emphasise at deriving a benchmark / standard index on how well the AI implemented in the insurance companies.

The Organization of thesis is as follows that Chapter 1 is Introduction followed by Literature Review in Chapter 2 , the literature review is focused on how AI is implemented in Insurance industry and how well the AI Implementation is benchmarked by the insurance industry. and Chapter 3 is of Research Methodology followed by Chapter 4 which is of Results and Discussions and finally Conclusion of the thesis is mentioned.

Contextual Background

Insurance industry, characterized by its complex processes and large volumes of data, traditionally involves extensive human intervention in areas like underwriting, claims processing, and customer service. However, with an advent of AI technologies, including machine learning, natural language processing, and predictive analytics, has enabled a paradigm shift. These technologies offer the option to enhance accuracy, efficiency, and customer engagement which fundamentally reshaping the industry's landscape.

Advancement in AI is helping Insurance industry across various operations area which includes but not limited to risk assessment, policy creation and customization, fraud detection and prevention, improving customer experience and management, operational improvement, efficiency and cost reduction etc.

As AI keeps getting better, it will affect the insurance industry furthermore. it will bring both opportunity and challenges for insurance industry. This paper will look closely at these changes and give insights and approach to address about how AI will shape the future of insurance.

1.2 Research Problem

While the integration of Artificial Intelligence (AI) in the insurance sector has brought many benefits, it has also introduced a range of challenges and complexities. This thesis aims to explore the problems the insurance industry faces due to AI's impact and also the acceptance of AI enabled insurance by the consumers, with a significant issue being the lack of standardized protocols and benchmarks for AI implementation within the sector. Focus of this thesis is to examine how well the AI enabled insurance is accepted and identify any standardized approach followed by Insurance companies.

The Need for AI Standardization in Insurance

The fast development and wide use of AI in insurance highlight the urgent need for industry-wide standards. Without these standardized guidelines, insurance companies struggle to apply AI consistently across different processes like risk assessment, claims processing, and customer interaction. This inconsistency can result in varied customer experiences, operational inefficiencies, and potential biases in decision-making.

Apart from the implication of data quality and integration issues insurance companies also face issues specific to regulatory compliance and ethical issues.

Impact on Market Competitiveness and Innovation

Companies with advanced AI might gain higher advantage, while others fall behind, possibly leading to market monopolies in insurance industries. Additionally, the uncertainty around AI use without clear standards can hinder innovation, as insurers may be reluctant to invest in new AI technologies without clear guidelines.

Strategic Planning and AI Implementation

Without a maturity model, insurance companies struggle to plan their AI development strategically. A maturity model acts as a roadmap, helping organizations progress from initial AI adoption to advanced integration. Without this framework, insurers lack clear benchmarks or milestones, which can cause AI initiatives to be misaligned with business goals and make it hard to measure progress effectively.

Innovation and Industry Benchmarking

A maturity model is essential for encouraging innovation and setting industry standards. Without which, insurance companies may find it difficult to measure their AI capabilities against industry peers, resulting in uneven innovation and a fragmented market.

1.3 Purpose of Research

The main objective of this research is to collect information from various Insurance companies and the people associated with insurance industry to understand what the limiting factors are there for implementing the AI in Insurance. Research also focusses on collecting information from consumers of insurance to understand their willingness to accept the AI driven insurance product. This research also aims to find and provide solution to insurance companies interns to address the maturity level of their AI implementation within their insurance organization.

1.4 Significance of the Study

The study enable us to identify how the customer responds to the AI enable insurance products, How insurance company senior management respond to the hurdles in enabling AI in Insurance companies. This research will focus significant effort of interms to solve the problems identified by the research can be addressed using the unique Insurance industry specific MARAI Framework which can be applied rightaway by any Insurance organization to access their maturity and identify gaps on the Insurance operations and how AI enablement can help bridge the Gap.

1.5 Research Purpose and Questions

To address the above concern following research questions are derived and the research is to identify approach to address these research questions:

1. What are the hurdles of Insurance companies when it comes to enabling the AI as part of their insurance operations?

2. How are customers responding to AI enabled insurance products and services and their acceptance of AI enabled products?

3. How and what solution can help solve the problem of gap in Ai enablement in Insurance industry, if any?

CHAPTER II

REVIEW OF LITERATURE

2.1 Theoretical Framework

As part of the research following Theoretical framework is followed:

1. Specify research objectives.

   - Research is focused on identification of the research papers related to the Artificial Intelligence.

   - How are Insurance companies utilizing AI?

   - What hurdles Insurance companies face when AI in insurance is implemented?

   - How companies approach large digital transformations that Maturity model assessments etc.,

2. Explore and review the literature through keywords identified as prominent variables.

   Following keywords are identified to search for the research papers.

   - AI in Insurance.

   - Artificial Intelligence and Machine Learning use cases in Insurance.

   - Artificial Intelligence maturity model.

   - Digital transformation maturity model.

2.2.1   AI in Insurance

In this paper "Understanding Insurance Company Operations" by (Outreville, 1998), the author explores the various departments and operations within insurance companies, highlighting their unique characteristics compared to other financial institutions. Insurance companies focus on collective risk management and act as financial intermediaries, with customers paying premiums upfront for services. The organizational structure of insurance companies includes several specialized departments such as administration, finance and investment, rate making and underwriting, and marketing. Additionally, they have unique departments like legal services, loss control, employee education, policyholder services, risk management services, claim adjustment, settlement, and actuarial services.

The flow of money in an insurance company goes through several stages and departments. The underwriting and actuarial departments develop insurance products, which the marketing department then promotes. Insurance producers educate agents, brokers, and customers about these products, leading to policy purchases and premium payments. Part of these premiums is invested to generate returns, and another part covers administrative costs. When a policyholder has a loss, he can claim his loss based on his policy provision and hence the claim processing cycle begins at the insurer end, this involving reporting the claim, processing the claim validity, adjusting the claim, settlement payment to the policy holder, and recording the claim process along with departments like legal services, risk management, and claim adjustment which playing key roles to manage the claim

processing effectively. The paper concludes that the collaboration of these departments is essential for the successful operation of insurance companies. Underwriting and actuarial department utilizes the policyholder data for creating new products and product positioning.

In "AI Impact on Insurance Business Model" by (Zarifis et al., 2019), the authors explore how artificial intelligence (AI) is changing the insurance industry. Author predict that about one-third of insurers could disappear within a decade due to challenges like unpredictable weather and intense competition. The research focuses on the shift of business-to-consumer (B2C) insurance to online platforms and how AI is changing the value chain. AI is already used for fraud detection, virtual assistants for customer service operations, and risk assessment, but its use varies among companies. The study highlights AI's potential to create new business models, author's also pointing out challenges like data availability and process adaptation. It considers the role of consumers in AI adoption and raises concerns about information gaps leading to lower quality services. The paper discusses the roles of various stakeholders in insurance life cycle, including insurers, consumers, government, and possible third-party certifications or technology companies, in building trust and ensuring AI reliability.

The research provides an industry and company-level analysis through 20 case studies and a focus group, demonstrating AI's disruptive potential in the insurance sector. It identifies current AI applications, develops an AI and data-driven value chain for B2C insurance, and outlines four AI-driven business models: disaggregation-based models, integration into

existing frameworks, expanding incumbent capabilities, and new AI-focused disruptors. The choice of model influences AI implementation, from readily available solutions to the development of extensive new capabilities. Despite its thorough analysis, the research lacks detailed guidance on implementing these business model innovations within insurance companies.

In "Insurance Business Model Impact Due to AI" by (Zarifis & Cheng, 2023), the authors explore the transformative impact of artificial intelligence (AI) on the insurance industry, amidst regulatory changes, climate shifts, and competition. They highlight the critical role of AI in developing effective and resilient business models within the insurance sector. The paper underscores the collaborative roles of insurers, consumers, and government in shaping AI's impact. Government intervention is necessary for regulatory adaptation, insurers face data quality and quantity challenges for effective AI implementation, and technology providers play a growing role. Additionally, the insurance workforce needs new skills and training to leverage AI effectively. The paper categorizes insurers into those offering a broad range of services and those focusing on specific types, noting the crucial role of data management in a data-driven economy.

The research identifies five emerging AI-influenced business models in insurance: focus and disaggregation, absorbing AI into the existing model, expanding incumbents beyond the current model, dedicated insurance disruptors, and tech company disruptors. These models illustrate the varied approaches insurers can take to integrate AI into their operations. However, the study acknowledges a significant gap—it lacks a detailed

implementation roadmap for achieving these business models. Despite outlining potential disruptions and opportunities brought by AI, the research does not provide specific strategies or steps for insurers to transition to these new models effectively.

2.2.2 AI and Machine Learning Use cases in Insurance

In "Future of Insurance Industry" by (Balasubramanian et al., 2018), the authors envision the insurance industry in 2030, driven by technological advancements, especially AI. Author depicts his vision in a story follows a customer named Scott, who uses a self-driving car managed by his digital assistant. His mobility insurer adjusts premiums based on the risk of his route, and his life insurance operates on a "pay-as-you-live" model. After a minor collision, automated diagnostics and AI-driven processes quickly approve the claim and repair the vehicle. This scenario shows the shift from a "detect and repair" to a "predict and prevent" model, where AI improves decision-making, reduces costs, and enhances customer experience. The paper emphasizes that insurance companies need to adapt by understanding the factors driving change and using AI in claims processing, policy distribution, policy underwriting, and insurance product pricing.

The research identifies four AI-related trends that are changing the insurance industry: 1) the rise of connected devices, 2) robotic-driven activities, 3) data ecosystems, and 4) improvements in cognitive technologies. These trends will transform policy distribution, claim processing, underwriting, and insurance product pricing. To handle these changes, the author recommends that insurance companies increase their AI knowledge, develop AI

focused strategic plans, build comprehensive data strategies, and enhance the right talent and technology infrastructure. While the research provides a detailed approach to address the future industry landscape, it lacks specific implementation strategies, leaving a gap in practical guidance for insurers to transition to these future approaches.

In "AI in Insurance Risk Prediction" by (Boodhun & Jayabalan, 2018), the authors explore how AI improves risk prediction in insurance companies, especially in life insurance. The paper emphasizes the importance of effective risk analysis and management in insurance operations. It uses a case study from Manulife, a Canadian insurance company, which analyzes survival rates for HIV patients using predictive analytics. This case study shows how over 100 characteristics and different data processing and machine learning algorithms are used for risk prediction, helping insurers understand and manage risk better.

The research identifies several applications of predictive analytics in insurance: modeling mortality rates in life insurance, disability scoring in property and casualty insurance, and classifying risk levels for underwriting processes. However, it notes gaps in the work, such as the absence of dashboards to visualize analysis outcomes and a lack of comparative evaluation of different algorithms. The authors argue that traditional actuarial approaches to risk assessment are complex, and the integration of machine learning offers a more effective method for performing risk assessments. Despite these advancements, the research highlights the need for more comprehensive tools and methodologies to enhance the predictive capabilities of insurance companies further.

In "AI Solutions for Problems Faced by Insurance Companies" by (Sushant K, 2020), the author addresses the various challenges within the insurance industry and how AI algorithms can mitigate these issues. Despite the insurance sector generating trillions of dollars in premiums, it faces significant losses due to fraud, which amounts to billions annually. Common types of insurance fraud include premium diversion, fee churning, asset diversion, workers' compensation fraud, and disaster-related fraud. The paper emphasizes the importance of AI in combating these fraudulent activities and improving the overall efficiency and effectiveness of insurance operations.

The research highlights numerous AI use cases applicable to the insurance industry, such as automating the underwriting process, AI-driven customer prospecting, targeting new business opportunities, personalized customer service, customer segmentation and targeted advertising, customer churn prediction, customer lifetime value prediction, fraud detection, loss prediction, claim rate prediction, life event marketing, recommendation engines, and insurance chatbots. However, the paper also notes gaps in the research, indicating that while many AI use cases have been identified, not all possible applications within insurance companies have been explored. Specifically, the study falls short in covering department-specific AI use cases, suggesting the need for further research to fully understand and implement AI across all facets of the insurance industry.

In "Explainable AI in Insurance" by (Owens et al., 2022), the authors explore the importance of Explainable Artificial Intelligence (XAI) models in the insurance industry, which deals with a lot of sensitive policyholder data. Author reviews 419 research articles

and focuses on 103 relevant ones published between 2000 and 2021. The study categorizes these articles to show the use of XAI techniques in different parts of the insurance value chain, especially in claims management, underwriting, and actuarial pricing. The main XAI technique identified is knowledge distillation and rule extraction, which simplifies large models into smaller, understandable ones with clear association rules. This advancement makes AI systems in insurance more trustworthy, transparent, and aligned with ethical standards.

The author is the first to provide a comprehensive analysis of XAI applications in the insurance industry, helps better understand applied XAI across various insurance industry peers. The authors propose a refined definition of XAI based on their systematic review, enhancing its clarity and practical application in the insurance context. However, despite its detailed analysis, the research lacks a specific approach or prioritization of specific use cases for insurance companies. This gap highlights the need for further exploration into practical implementation strategies and prioritization of XAI applications within the industry.

In the paper "Infusing AI in Insurance Underwriting" by (Maier et al., 2020), the authors present a method to improve the accuracy of the underwriting process in life insurance using AI. The research also highlights the essential role of life insurance in providing financial security and addresses the challenge of balancing affordability with effective risk management. Traditional underwriting methods are considered slow and outdated for modern digital standards. Author developed a mortality model using large historical

datasets and life score. This AI solution led to a nine-percent reduction in claims among the healthiest applicants. Author also emphasizes the importance of transparency in algorithmic decision-making to build consumer trust and comply with regulations, author suggesting a consumer-facing tool with option to explain and interpret machine learning model to clarify the life score calculation.

In this research author suggests using an AI-enhanced rule engine for underwriting, providing a workflow using technological and an explainable AI system (including Interpretable AI) to improve decision-making in the automated environment. The authors used 20 years of application data from MassMutual to consistently compare applicants within demographic groups (for example people in a specific region are grouped together), it showed a significant benefits for profitability and customer experience for Massmutual. Author suggests future improvements include exploring additional data sources like prescription drugs used by the insureds, financial data of the policy holders, and genetic information, and developing mortality models that don't rely on lab tests, enabling faster underwriting decision making. Author emphasizes the need for advancements in algorithmic fairness and transparency and the adoption of a standard measure of mortality risk, which could lead to innovations such as increased access to insurance and wellness programs with measurable mortality benefits. Some of the shortcoming on this research is author mainly focuses on life insurance and does not address other types of insurance, also it does not provide a general approach to assess the maturity level of underwriting processes in different insurance companies.

The below diagram details the authors point of view of the proposed solution.
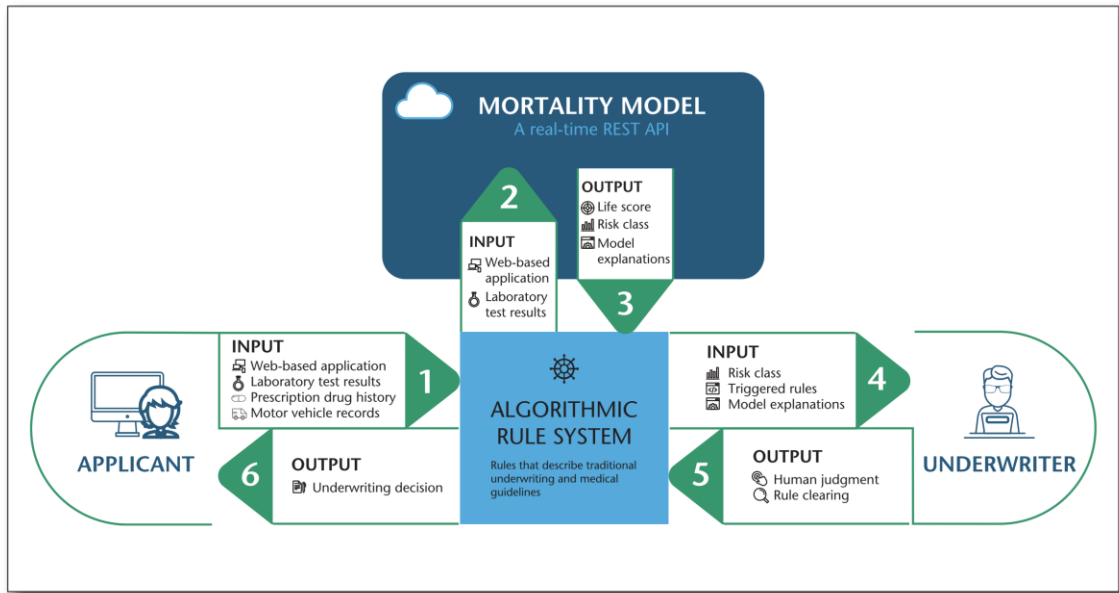
Figure-1: Underwriting automation using AI

In "Machine Learning Application in Non-Life Insurance" by (Ekin, 2020), the author explores the transformative role of data and quantitative analysis in the insurance industry. Technological developments in insurance industry, referred to as InsurTech, include artificial intelligence, machine learning, statistics, and big data, leading to significant changes in sectors such as Insurance and financial services. The traditionally regulated and risk-averse insurance industry is now adapting to these changes due to deregulation, customer demands, and competition from unique InsurTech startups. The paper highlights various machine learning applications in non-life insurance, such as claim handling, marketing, sales, risk assessment, and fraud detection. It emphasizes the challenges of

interpretability in retention modeling and the emergence of Explainable AI (XAI) models to address these concerns. Additionally, the paper discusses the use of machine learning in decision support systems, proactive retention models, dynamic pricing, and combating fraud through automated claim handling.

The paper highlights the need to regulate the use of discriminatory variables like gender and race in automated decision-making processes and suggests using discrimination-aware data mining methods to assess and correct impacts. Author discusses the potential benefits of automated systems in promoting healthier lifestyles and safer driving habits. Author addresses challenges like premium volatility, insuring robotic devices, and accurately predicting rare, high-impact events like natural disasters or pandemics. It concludes by suggesting that the insurance industry should shift from traditional risk protection to risk prevention, author also highlight to urge the policymakers to balance data privacy with technological innovation. Author fail to provide a detailed approach on how insurance companies can effectively prioritize and implement these solutions.

In this paper "Machine Learning in Forecasting Motor Insurance Claims" authors (Poufinas et al., 2023) examines the application of machine learning (ML) techniques to enhance the accuracy of motor insurance claim predictions. One of the Important approach introduced by the author in this research is introduction of novel variables, such as weather conditions and car sales along with the traditional machine learning models that primarily use vehicle and driver data for the insurance claim predictions. Review of this literature highlights the transition from normal machine learning models to utilizing advanced machine learning

techniques, which transforms the way the claim predictions are made. Research by authors such as (Fauzan & Murfi, 2018), (Rustam & Ariantari, 2018), and (Pesantez-Narvaez et al., 2019), demonstrate the integration of machine learning in various aspects of insurance, including claims prediction, handling missing data, and leveraging telematics data. Recent Research by (Poufinas et al., 2023) shows the significance of additional external factors other than the normal driver behavior and its impact on the model prediction outcome.

Author further analyzes into machine learning models role in other insurance processes beyond claims forecasting. For example, (Bermúdez et al., 2021) and (Knighton et al., 2020) details how data from hydrologic and demography can help in predicting the claim counts and predicting flood insurance claims. The research by (Pérez et al., 2005) and (Severino & Peng, 2021) also addresses machine learning's effectiveness in fraud detection. One important research by (Baudry & Robert, 2019) details how normal actuarial practices of insurance industry is disrupted by advancement in the machine learning models in estimating claims reserves, which intern help insurance companies to improve claim prediction accuracy and increase operational efficiency. Author points out ongoing challenges in applying machine learning, such as the need for better interpretability, regulatory compliance, and ethical considerations. Author concludes by advocating for the continuous improvement of ML models in insurance, emphasizing the integration of diverse data sources to enhance predictive accuracy, and calls for further research to validate and implement these models in practical settings.

The research paper "A Machine-Learning-Based Business Analytical System for Insurance Customer Relationship Management and Cross-Selling" by (Tian et al., 2023) explores the use of machine learning (ML) techniques to improve customer relationship management (CRM) and cross-selling in the insurance industry. It introduces a new three-stage Machine Learning-Based System (MLBS) designed to better identify potential insurance customers and optimize cross-selling strategies. Author uses under-sampling methods and an ensemble approach to improve the system's prediction performance. This ensemble approach includes selecting the best training sample with artificial neural networks (ANNs) and using a stacking ensemble method, in helped author achieve superior prediction results with the highest recall, precision, and Area Under the Curve (AUC) Score. This innovative use of stacking ensemble learning in cross-selling insurance help enhances the efficiency of cross-selling campaigns in various businesses, marking a major contribution to the insurance sales.

Author in the paper highlights the significant potential of machine learning (ML) in customer relationship management (CRM), especially for cross-selling activities. It references various studies to showcase different machine learning applications in insurance. For instance, (Hanafy & Ming, 2021), used random forest regression to forecast insurance customer profitability, while (Bockhorst et al., 2017), developed an ML-based framework to predict customer claim satisfaction. The review also discusses customer segmentation techniques, such as k-means clustering by (Roodpishi & Aghajan Nashtaei, 2015) and dynamic segmentation technique using Latent Dirichlet Allocation (LDA). These studies demonstrate the value of big data and AI in accurately predicting human

behavior and improving business activities. Author in this research insists for more transparent and interpretable AI models to enhance decision-making in marketing and customer relationship management. Author proposes a unique approach to predict customer behavior and boost cross-selling efficiency. The results show that the ANN model (particularly with under-sampling) performs best in predicting cross-selling opportunities, indicating that the MLBS has the potential to revolutionize customer relationship management practices in the insurance industry.

The research paper "The Impact of Machine Learning on the Future of Insurance Industry" by (Paruchuri, 2020) provides a detailed analysis of how machine learning (ML) is transforming the insurance sector. Author details the rapid growth of data generation from sources like social media, telematics, wearable devices, and networking sensors, which requires advanced technologies for effective data management. Author notes that the insurance industry is undergoing a major shift due to machine learning integration, which improves insurance underwriting, claims management, fraud detection, product evaluation, and customer service.

Author in this research highlights the main benefits of machine learning (ML) in the insurance industry, such as simplifying complex datasets and improving the accuracy of risk assessment and forecasting. Author reviews various machine learning techniques, including supervised learning, unsupervised learning, and reinforcement learning, focusing on their applications in processing large amounts of structured and unstructured data. The paper also discusses challenges in implementing machine learning, like data quality,

regulatory compliance, and the need for skilled experts to avoid misleading correlations. The integration of machine learning into insurance processes is seen to enhance efficiency, accuracy, and customer satisfaction, ultimately helping insurance firms manage their operations better and compete in a data-driven industry.

Claim processing is an important part of Insurance companies differentiator, research paper "A Model for the Detection of Insurance Fraud" by (Belhadji et al., 2000) aims to create a systematic model to help insurance companies identify fraudulent claims, especially in the automobile insurance sector. Using data from their study, the authors identify 23 significant fraud indicators from an initial set of 54. In this research author included a thorough sampling process, collecting data from 18 major automobile insurance firms in Quebec, which represent 70% of the market. The machine learning model employs a Probit approach to estimate the probability of fraud in claims files, balancing detection and accuracy rates through various probability thresholds.

Author developed the machine learning model along with a user-friendly software interface that allows insurance adjusters to input data and receive a fraud probability score, helping supervisors decide if a file needs further investigation. Although the model's parameters are based on industry-wide data, each insurance company need to conduct their own studies to customize these parameters for their specific needs. The authors also discuss the costs of investigations and highlight the need for future research to refine the model and include additional fraud indicators. This research concludes by emphasizing the model's

effectiveness in reducing fraudulent claims and the importance of continuous improvement in predictive modeling for fraud detection in the insurance industry.

2.2.3   Maturity Model

In "Customer Knowledge Management Maturity Model for the Insurance Sector" by (Ranjbarfard, 2016), the author creates a specialized model to evaluate the maturity of Customer Knowledge Management (CKM) in insurance organizations. Through interviews with industry experts, the study identifies key customer processes specific to insurance companies and incorporates these processes into an existing CKM maturity model, resulting in a tailored tool for measuring CKM maturity in this sector. Author applied this model to ten insurance companies revealed that most organizations were in the early stages of maturity (levels 1 or 2). Author through this research emphasizes the importance of managing customer knowledge for competitive advantage and financial performance, addressing gaps in existing models that focus more on CKM implementation rather than assessing organizational maturity.

Author details a unique methodology by which identifying customer processes in insurance firms, developed a customized CKM maturity model, creating a measurement tool, and using this tool to assess its correlation with market share. Findings based on the research shows a significant positive correlation between CKM maturity and market share, indicating that higher CKM maturity leads to better market performance. The research concludes that a specialized CKM maturity model and measurement tool can help insurance managers evaluate and improve their CKM maturity. Author recommends future

research to develop guidelines for enhancing CKM maturity levels and effectively implementing CKM models in insurance companies. Author through this research emphasized that the integration of customer relationship management and knowledge management are essential to boost organizational performance.

In "Green ICT Maturity Models: Towards a General Approach" by (Foogooa et al., 2015), the authors examine various Green Information and Communication Technology (ICT) maturity models to help organizations manage their Green ICT initiatives sustainably. The paper emphasizes the importance of Green ICT in reducing environmental impacts and acknowledges the challenges organizations face in maintaining these initiatives. By comparing different maturity models, the study identifies significant differences among them, complicating the selection process for organizations. The comparison includes models by Graeme, Desai & Bhatia, Donnellan Sheridan & Curry, Hankel Oud Saan & Lago, and the UK Government, each evaluated for focus areas, maturity levels, and unique characteristics. For example, Graeme's model ranges from 0 (No Intention) to 5 (Optimization), focusing on attitude, policies, practices, technology, and metrics, while Desai & Bhatia's model ranges from 1 (Deficient) to 5 (Sustainable), assessing operations, behavior, and achievements.

The authors propose a general Green ICT maturity model that incorporates key elements from the analyzed models. This proposed model includes five maturity levels: 0 - Reckless, 1 - Ad-hoc, 2 - Conscious, 3 - Responsible, and 4 - Role Model, each representing increasing levels of awareness, strategy formulation, and implementation of Green ICT

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practices throughout an organization. Research also includes the supply chain of the organization as part of the maturity assessment. The paper concludes that while lower maturity levels show some agreement among models, higher levels exhibit significant differences in expectations and criteria. The authors recommend future work to focus on quantitative assessments to validate their qualitative findings and also further development and testing of the proposed general Green ICT maturity model as a platform to enable companies to access, and the creation of a taxonomy of Green ICT maturity models to guide future companies in the field.

In "Comprehensive Review of Digital Maturity Model and Proposal for A Continuous Digital Transformation Process with Digital Maturity Model Integration" by (Pham Minh & Pham Thi Thanh, 2022), the authors examine the Digital Maturity Model (DMM) in light of the increasing need for digital transformation (DX) across industries, especially accelerated by the COVID-19 pandemic. Author stress that digital transformation is crucial for businesses to remain competitive, as it involves significant enhancements in performance and reach through technology. Author identified that irrespective of the economic challenges, investment in digital transformation continues to rise, with projections indicating that the digitalized economy will constitute a substantial portion of the global GDP. Author in this research details the Digital Maturity model as an essential framework for organizations to assess their digital maturity, identify capability gaps, and benchmark progress. Author detailed in the research that the Digital Maturity model (DMM) is originating from 1970s software engineering and has evolved into a comprehensive tool for improving business processes.

Author provides a thorough review of existing Digital Maturity Models (DMMs) by analyzing peer-reviewed papers to understand their characteristics, structures, and applications. In this research author highlights the wide range of approaches and dimensions in DMMs, which cover aspects like organization, process, strategy, and technology. Despite this variety, author found that there remain many challenges in standardizing terminology and components, making these maturity models accessible for small and medium enterprises, and integrating DMMs into a continuous digital transformation (DX) process. The authors propose a conceptual model that incorporates DMM development and assessment into an iterative digital experience process, enabling organizations to continuously evaluate their digital maturity, using the assessment implement changes, and update their models to keep up with technological advancements and market changes. The research emphasizes the importance of Digital Maturity models in enabling digital transformation and calls for the creation of adaptable, industry-specific models to support businesses at different maturity stages.

In "Developing a Maturity Model for AI-Augmented Data Management" by (Defize, 2020), the author addresses the increasing complexity in data management due to the exponential growth in data volume, variety, and velocity. In this research author emphasizes the potential of augmented data management (ADM) to automate and enhance data management tasks through artificial intelligence (AI), thereby removing the challenges faced by companies. Author proposes a tailored maturity model for automated data management to assess and improve the data management capabilities. The research follows a Design Science methodology across three main phases: a literature review

establishing the theoretical foundation, the design and development of the ADM Maturity Model, and its evaluation and refinement through expert feedback and case studies. Author also created an Excel-based assessment tool to apply the model in real-world scenarios.

The ADM Maturity Model emphasizes five key capabilities essential for effective data management: 1) data quality, 2) metadata management, 3) data integration, 4) master data management, and 5) database management. These areas were chosen due to their significant impact and the amount of manual work involved in data management processes. Author introduced a new maturity scale in the model specifically for augmented data management. Authors contributions include providing a comprehensive framework for evaluating and enhancing ADM capabilities within organizations and offering practical tools for managers to assess their current state and identify improvement pathways. Author proposes future research directions includes increasing the model's objectivity, expanding its scope to include additional capabilities like data governance, and further validation through practical implementation. This research and the proposed maturity model along with the AI model is a significant step in helping organizations use AI to enhance their data management practices, contributing to the broader digital transformation landscape.

In "Insurance Risk Assessment and Maturity Model" by (Almajali, M., & Shamsuddin, 2019), the authors examine the relationship between capital structures and profitability in Jordanian insurance firms. The study finds that both short-term debt (STD) and long-term debt (LTD) have a positive correlation with return on equity (ROE), but a negative correlation with Tobin's Q, which measures firm value. Equity financing (ETQ) is

positively correlated with all profitability measures, which indicate that higher financial leverage is directly linked to the increased profitability of the organization. Author based on the research concludes that an optimal mix of debt and equity can boost a company's profitability, highlighting the importance of strategic capital structure decisions in maximizing financial performance and firm value. Author concludes that AI can help provide a better approach to perform organization wide risk assessment.

In this research (Krishnamurthy et al., 2005) discuss the major changes in the Indian insurance sector following liberalization and the entry of private insurance companies. Author highlights the rapid market share gains by private insurers and the sector's untapped potential. Key challenges identified include insurance product innovation, competition, distribution systems, technological integration, and regulatory environments. Author through the research anticipates steady industry growth driven by innovative products, improved service levels, and deeper market penetration strategies. The research emphasizes the dynamic nature of the insurance market and the crucial role of strategic advancements in maintaining a competitive edge and ensuring sustained growth.

The research paper "The Application of the Maturity Model SIMMI 4.0 in Selected Enterprises" by (Leyh et al., 2017), examines the challenges and opportunities brought by digitalization, particularly in Industry 4.0 based businesses. The authors focus on the development and use of the System Integration Maturity Model Industry 4.0 (SIMMI 4.0) to help companies assess their IT system landscape and readiness for Industry 4.0. Author also highlights the necessity of such a model due to the complexity and rapid changes of

digital transformation. SIMMI 4.0 provides a toolset for businesses to evaluate their current IT infrastructure against Industry 4.0 requirements, helping them identify areas for improvement and better manage their digital transformation efforts.

The SIMMI 4.0 model is divided into five maturity stages, each representing different levels of digitization and integration across four dimensions:

- vertical integration,

- horizontal integration,

- digital product development,

- Cross-sectional technology criteria.

Author as part of the research applied this model to selected enterprises through a questionnaire-based approach. Author details that companies by using SIMMI 4.0 to independently analyze their digitization level and IT system landscape. Based on the result author details that while some companies tend to overestimate their maturity levels, utilizing SIMMI 4.0 model can provides a more accurate assessment, guiding them on a suitable digital transformation strategy. Author details with suggestions for further refinement and wider application of SIMMI 4.0, it also insist on the need for continuous evaluation to keep up with evolving digitalization demands.

The research paper "Development and Application of a General Knowledge Management Maturity Model" by (Teah et al., 2006) addresses the need for a comprehensive and adaptable Knowledge Management Maturity Model (KMMM) to assess the maturity of

knowledge management (KM) across important aspect of any organizations like people, processes, and technology. Author identifies the limitations of existing KMMMs, and propose a General KMMM (G-KMMM) to offer a structured and systematic approach for evaluating knowledge management maturity levels. The new model proposed by the author help organizations understand their current KM status and identify areas for improvement, thereby supporting a gradual and holistic development of KM capabilities.

The G-KMMM is structured into five maturity levels: 1) Initial 2) Aware 3) Defined, 4) Managed, and 5) Optimizing. Each level has specific attributes and key process areas (KPAs) related to people, process, and technology. The proposed model emphasizes that organizations should move through these levels sequentially, as each builds on the previous one. The authors also created an assessment tool to apply the G-KMMM practically, featuring detailed descriptions and key practices for each maturity level and KPA. Author used the newly developed tool and tested as a case study for a large public university's KM efforts, showing the model's effectiveness in diagnosing KM maturity and guiding KM implementation. Author concludes that while the G-KMMM is a valuable framework for assessing and improving KM maturity, detailed further research is needed to validate the model in different contexts across organizations and identify various KM practices at different maturity stages.

2.2.4   AI and Digital Maturity Model and Insurance

In the paper "The Extended Digital Maturity Model" by (Haryanti et al., 2023) author introduces the Digital Transformation Self-Assessment Maturity Model (DX-

SAMM) to help organizations evaluate on its own without a need of external evaluators and enhance their digital maturity. The authors emphasize that digital transformation (DX) is crucial in today's business environments. To achieve the DX organization requires fundamental changes in strategy, structure, and processes. Author also details that by 2030, a significant part of the global economy is expected to depend on digital platforms, making structured frameworks like DX-SAMM is an important step. Author through this research presents digital maturity as a holistic concept covering various dimensions including technological, social, economic, and cultural dimensions, providing organizations with a tool to assess their current digital state, plan for improvements, and create a benchmark against best practices across industry.

Author while developing the DX-SAMM performed a detailed literature review and a comparative analysis of 44 existing digital maturity models, revealing that none fully met all evaluation criteria. This gap led to the creation of a comprehensive and integrated approach that combines theoretical foundations with empirical data. The development process included problem identification, model comparison, strategy determination, model creation, and validation through case studies. Author identified seven key dimensions as critical for successful digital transformation: 1) organization and structure 2) technology 3)strategy 4) customer 5)employee 6)culture and 7)process transformation. Author applied the maturity model in the education and transportation sectors, DX-SAMM effectively assessed digital maturity levels and provided actionable recommendations. The authors emphasize the importance of continuous assessment and adaptation, suggesting future research to enhance the model's objectivity, expand its scope, and validate its use across

different industries. Author in this research highlights the need for adaptable, industry-specific maturity models to guide organizations through their digital transformation journeys.

Author in this research paper "Artificial Intelligence Maturity Model: A Systematic Literature Review" by (Sadiq et al., 2021) aims to provide a comprehensive review of the existing literature on AI maturity models. Author acknowledges the increasing importance of AI in various sectors and the need for organizations to assess and enhance their AI capabilities systematically. The authors conducted a systematic literature review (SLR) to identify and analyze AI maturity models proposed in academic and industry sources. Author in the research highlights the key dimensions, characteristics, and applications of these models, providing insights into their development, implementation, and assessment.

The research paper "Artificial Intelligence Maturity Model: A Systematic Literature Review" by (Sadiq et al., 2021) offers a comprehensive review of existing literature on AI maturity models. The study recognizes the growing significance of AI across various sectors and the necessity for organizations to systematically assess and improve their AI capabilities. The authors conducted a systematic literature review (SLR) to identify and analyze AI maturity models presented in both academic and industry sources. The paper outlines the key dimensions and characteristics, along with the applications of these models. In the paper also discuss about offering insights into their development, implementation, and evaluation.

The methodology involved a structured approach to collecting and analyzing relevant literature. The authors identified 35 primary studies proposing AI maturity models, categorizing them based on focus areas such as 1)strategy 2)technology 3)data and 4)people. They found that most models emphasize the strategic alignment of AI initiatives, the importance of data governance, and the need for a skilled workforce. However, there is considerable variability in the maturity stages and assessment criteria across different models. The study concludes that while existing models offer valuable frameworks for assessing AI maturity, there is a need for more standardized and comprehensive models applicable across various industries. The authors suggest that future research should focus on developing adaptable models that integrate emerging AI technologies and address the dynamic nature of AI implementation.

The research paper "Maturity Model for Determining Digitalization Levels within Different Product Lifecycle Phases" by (Siedler et al., 2021) aims to create a comprehensive framework for assessing the digital maturity of manufacturing companies. The authors developed the InAsPro maturity model, which evaluates the digitalization level across four product lifecycle phases: Development, Production, Assembly, and Aftersales, in addition to the overall Corporate Level. This model helps manufacturing companies understand their current state of digital readiness and identify areas for improvement, intern supporting their digital transformation efforts.

The InAsPro maturity model incorporates four key dimensions—1) Technology 2) Organization 3)Social and 4)Corporate Strategy—to offer a comprehensive view of a

company's digitalization status. Each dimension includes various criteria and indicators that are evaluated to determine the maturity level. The model distinguishes between the different product lifecycle phases, identifying that digitalization needs and challenges vary at each stage of production and operations. The maturity levels range from Explorer to Expert, with detailed descriptions of the digitalization degree for each phase. This approach allows companies to benchmark their digital maturity, set targeted digital transformation goals, and develop strategies to enhance their digital capabilities, ultimately leading to improved efficiency and competitiveness.

The paper "Striving for Excellence in AI Implementation: AI Maturity Model Framework and Preliminary Research Results" by (Pawłowski & Oleskow-Szlapka, 2019) presents an AI maturity model designed to integrate and advance AI within Industry 4.0 and Logistics 4.0. Building on existing Logistics 4.0 maturity models, this framework helps companies, particularly in manufacturing production and warehousing, evaluate their AI capabilities and identify and recommend how they can improve. The model aims to guide businesses through the complexities of AI adoption, highlighting AI's transformative potential in enhancing efficiency and solving complex production and logistics problems. The authors details the importance of improving AI usage as it will help manufacturers to remain competitive.

The research methodology involves several stages: conducting a comprehensive literature review, enhancing the AI maturity model, developing a detailed questionnaire, and performing multi-case studies in Norwegian and Polish companies. The literature review

revealed a significant gap in research on AI maturity models specifically within the context of Logistics 4.0. As a result, the authors combined AI maturity levels with existing Logistics 4.0 models to create a comprehensive assessment tool. The proposed model categorizes companies into four levels: AI Novice, AI Ready, AI Proficient, and AI Advanced, based on key pillars such as 1) strategy 2)organization 3)data technology and 4) operations. Preliminary findings indicate that most companies are at the AI Novice level, encountering common barriers like budget constraints, technological challenges, and a lack of expertise. The study highlights the importance of continuous assessment and improvement in AI maturity to achieve excellence in digital transformation.

2.3 Summary

The comprehensive literature review examines various aspects of the insurance industry's operations and the impact of Artificial Intelligence (AI). It starts by detailing the operations of insurance companies, highlighting the unique organizational structures and departments essential to risk and financial management. The review highlights the importance of strategic risk management and the nature of insurance transactions, where premium payments are made before service delivery.

A major portion of the review focuses on the impact of AI on the insurance business model. It discusses AI's potential to disrupt traditional business practices, driven by technologies such as the Internet of Things (IoT), big data, and blockchain. The research identifies challenges like unpredictable weather patterns and intense competition, but also highlights

opportunities for innovation through AI. The review pays particular attention to the business-to-consumer (B2C) insurance sector, noting the shift towards online platforms and the restructuring of the value due to AI adoption. It details varying degrees of AI implementation across organizations and analyzes the roles of consumers, insurers, and government in facilitating. Furthermore, the review delves into the future of the insurance industry, projecting a shift from a "detect and repair" model to a "predict and prevent" approach. This future scenario emphasizes the role of connected devices, data ecosystems, and advancements in AI technologies in reshaping Insurance policy distribution, claim analysis and processing, automated underwriting, and Insurance pricing.

In the area of risk prediction, the review details how AI enhances predictive analytics for risk assessment, with specific use cases like survival rate analysis for HIV patients and predictive modeling for property and casualty insurance. It also examines AI solutions for industry challenges, covering use cases such as automating underwriting processes and fraud detection. The review emphasizes AI's significant potential to address multi-billion dollar losses due to insurance fraud.

Major segment of the review focuses on Explainable AI (XAI) in insurance, providing a thorough analysis of XAI applications and their importance in enhancing transparency and trust between humans and AI systems within the insurance value chain.

Additionally, the review addresses the integration of AI in insurance underwriting, detailing a more accurate and transparent approach using AI-infused rule engines and algorithmic underwriting systems. It also explores machine learning applications in non-

life insurance, examining the impact of technological advancements on claim handling, risk assessment, and customer experience.

Finally the review analyses various maturity model approach and how to approach building the new maturity model.

The review identifies research gaps, especially in outlining clear strategies for implementing AI-driven business model innovations and prioritizing AI solutions within insurance companies. It highlights the profound impact of AI on the insurance industry, from operational efficiencies and risk prediction to business model transformation and prospects. However, it also emphasizes the need for further research to address these implementation gaps. Al it highlights the un availability of Maturity model specific to AI in insurance industry.

CHAPTER III

METHODOLOGY

3.1 Overview of the Research Problem

The research methodology for this study on the impact of the AI in insurance industry is designed to provide a comprehensive and rigorous analysis of the issue. The methodology incorporates both qualitative and quantitative approaches to ensure a comprehensive understanding of the challenges and implications. The research methodology for the proposed work includes the following steps:

1. Quantitative Research:

   - Develop and distribute surveys to a wide range of insurance industry professionals to collect quantitative data on the perceived impacts of the absence of a maturity model, challenges in AI integration, and the effectiveness of current AI strategies. Analyze the survey data to identify patterns, correlations, and prevailing industry trends.

2. Case Study Analysis:

   - Select a few insurance companies that have implemented AI at varying levels. understand the case studies on how the absence of a maturity model has impacted their AI adoption journey, risk management, compliance, and competitive positioning.

3. Comparative Analysis:

- Compare the insurance industry's approach to AI integration with that of other sectors that have established AI maturity models. This analysis seeks to identify best practices and lessons that can be adapted for use in the insurance industry.

4. Data Analysis and Interpretation:

- Employ statistical method analysis to interpret the data collected from surveys and case studies.

- Analyze findings to draw meaningful conclusions about the impacts and challenges faced due to the absence of an AI maturity model.

5. Framework Development:

- Based on the research findings, propose a preliminary framework for an AI maturity model tailored to the insurance industry. This model to address identified challenges and support effective AI integration and management.

6. Validation and Feedback:

- Present the proposed model to a panel of experts for validation and feedback. Refine the model based on their input to ensure its relevance and applicability to the insurance industry.

Final Analysis and Reporting:

Compile the research findings, analyses, and the proposed maturity model into a comprehensive report. This report will present a detailed account of the research process, findings, conclusions, and recommendations for industry practitioners.

The research methodology is designed to be iterative and adaptable, allowing for modifications based on emerging insights and industry developments. This approach ensures that the study remains relevant and provides actionable insights for the insurance industry in its AI adoption journey.

3.2 Operationalization of Theoretical Constructs

As part of the research, a detailed survey questionaire is created to collect survey results. Two set of target auidence were identified and survey questionaire was conducted with them. First set of auidence are specific to Insurance industry leaders C level executives, employees working on the Insurance industry. Second set of auidence are specific to the consumers of Insurance products.

3.3 Research Purpose and Questions

Research is focused on collecting the response from the two set of insurance industry team to understand their alignment towards the AI in Insurance. As part of that following questions are shared with the survey participants. The detailed list of questionaire is mentioned in Appendix.

3.4 Research Design

As part of the quantitative analysis, research survey was conducted with two category of people. Insurance industry professionals including senior leaders, Insurance technology professionals etc. Second group of people including end users of the insurance products and services to understand their acceptance level of the impact of AI in insurance

To enable the survey , two set of Google Form sheets questionnaire is created. To reach and identify the people following strategy is incorporated.

Specific to Insurance Leaders LinkedIn user groups , Linked In connections and Industry user groups are identified and a personalized request is shared with individual leaders to collect their feedback.

Specific to the Insurance consumers personal messaging application groups, friends, network colleagues are reached with personalized request to collect their feedback.

3.5 Population and Sample

Specific to the Insurance consumers More than 250 people were reached and out of that 92 people responded to the survey request. Specific to the Insurance leaders more than 100 leaders were reached and out of those 26 leaders responded with their survey. Hence, 92+26= 118 people responded for the survey in total.

3.6 Participant Selection

Specific to the Insurance leaders only people working in the Insurance companies and at a leadership position are considered for the survey. Specific to the Insurance consumers network people including friends, family and colleagues are considered for their response with the criteria that they should have purchased the insurance policy from any of the Insurance company.

3.7 Instrumentation

Google Form survey questionnaire was used for conducting the survey. A detailed request email, request message is formulated and using various Online approach like user group posting, direct LinkedIn connection, direct message on messaging applications are used as an instrument for reaching to the survey participant.

3.8 Data Collection Procedures

A detailed google form questionnaire is created to share with the survey participant individually. The survey response details are stored on the google form response excel sheet. The excel sheet is further analyzed for the survey response.

3.9 Data Analysis

A detailed excel based data analysis is done along with a python programming based approach for creating charts and graphs conducted.

3.10 Research Design Limitations

The survey was distributed only through online mode and no paper based survey was conducted.

3.11 Conclusion

Specific to the research question focused on what the hurdle is when it comes to insurance leaders for implementing AI in their company is analyzed with 26 Insurance leaders responding to the survey questionnaire successfully. Similarly, what is the acceptability of the AI enabled insurance products by the consumers were responded with 92 people responding for the survey in total 118 people responded for the survey conducted.

CHAPTER IV

RESULTS

4.1 Research Question:

What are the hurdles of Insurance companies when it comes to enabling the AI as part of their insurance operations?

The Survey questionnaire related to the insurance industry was shared with senior C level executives of insurance industry. The survey includes questions about the countries in which companies offer or sell insurance products, the roles of the respondents within the insurance industry, the types of insurance products offered, and various other aspects related to the use of AI and technology within the insurance sector. The data includes multiple choice and open-ended responses.

Following are initial analysis performed on the data received:

Distribution of Respondents by Country: Analysis using a bar chart showing the number of respondents from each country.

Distribution of Respondents by Country
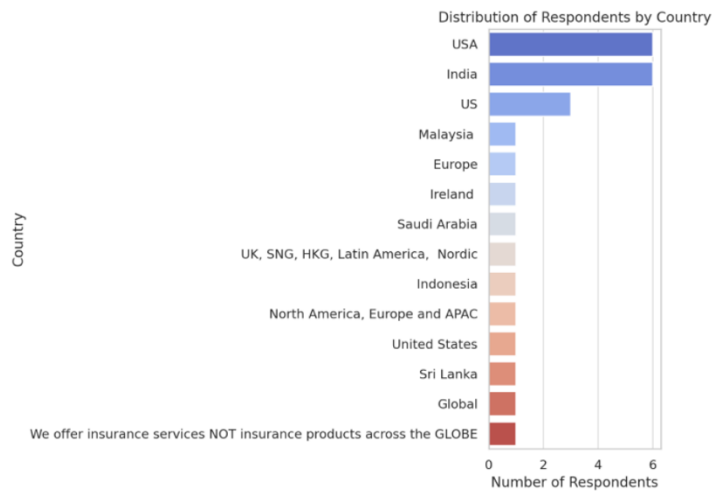
Figure -2: Analysis visualization of number of respondents.

This bar chart visualizes the number of respondents from each country, highlighting the geographical diversity of the survey participants.

Roles within the Insurance Industry: The bar chart displaying the distribution of roles (e.g., IT and Technology, Senior Executive, Insurance Operation).
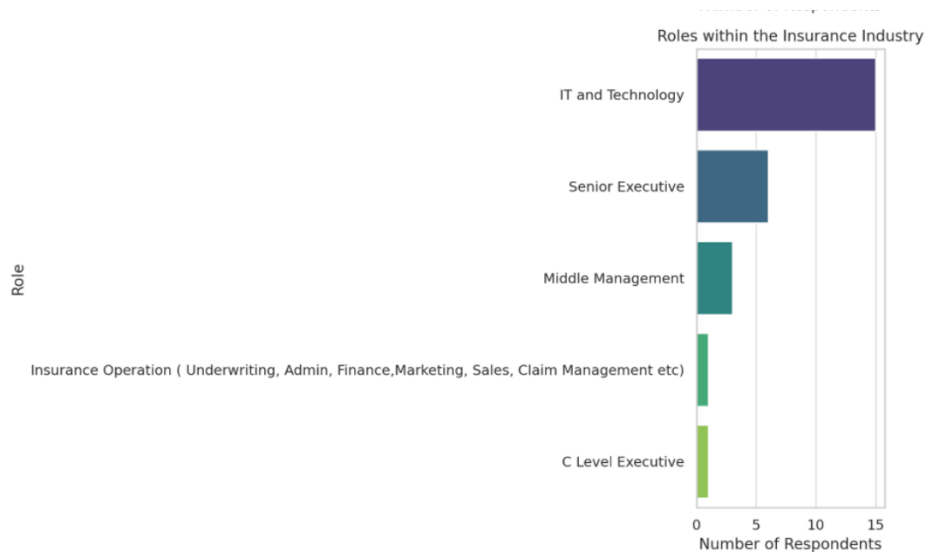
Figure-3: Analysis visualization of roles of the respondent

This chart in figure 3, shows the distribution of roles of the survey respondents within the insurance industry. It categorizes participants into roles such as IT and Technology, Senior Executives, and those involved in Insurance Operations, among others. The majority of the people responded from the IT end of insurance leadership team.

Types of Insurance Products Offered: A bar chart or stacked bar chart showing the number of companies offering each type of insurance product (e.g., Auto, Health, Life).
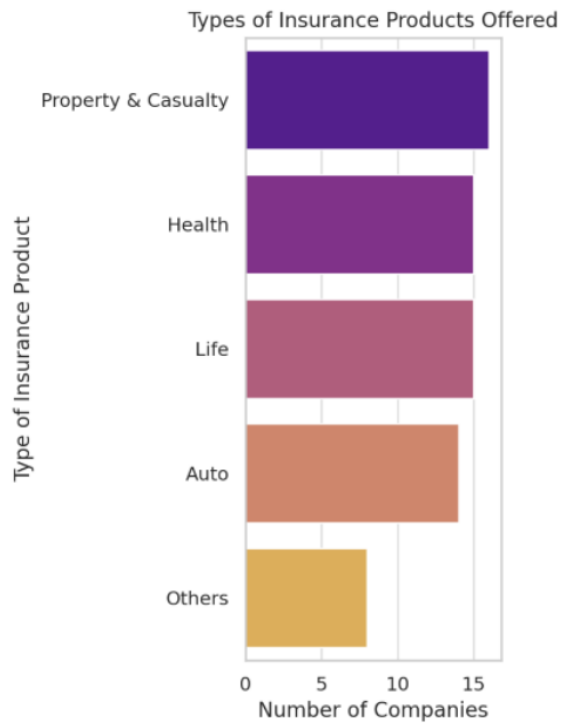
Figure-4: Analysis visualization of number of respondents associated with type of products

In this chart in fig 4, a detailed the variety of insurance products offered by the companies of respondents, including Auto, Health, Life, and Property & Casualty insurance, among others is shown. This chart showcases the range of insurance services covered by the survey.

The presence of an AI strategy within companies:
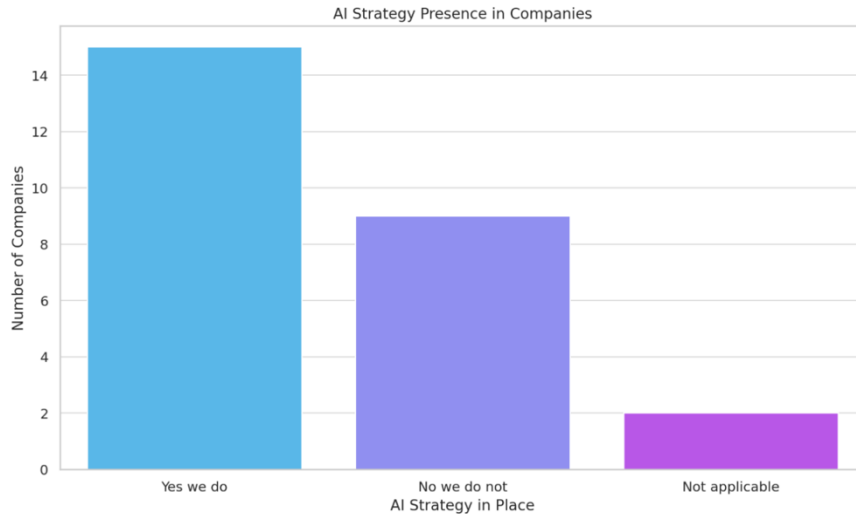
Figure-5: Analysis visualization of AI strategy with in companies.

In fig 5, this chart shows whether companies have an AI strategy in place. The presence of an AI strategy is crucial for guiding the adoption and integration of AI technologies within organizational processes and products.

The application of AI in insurance products:
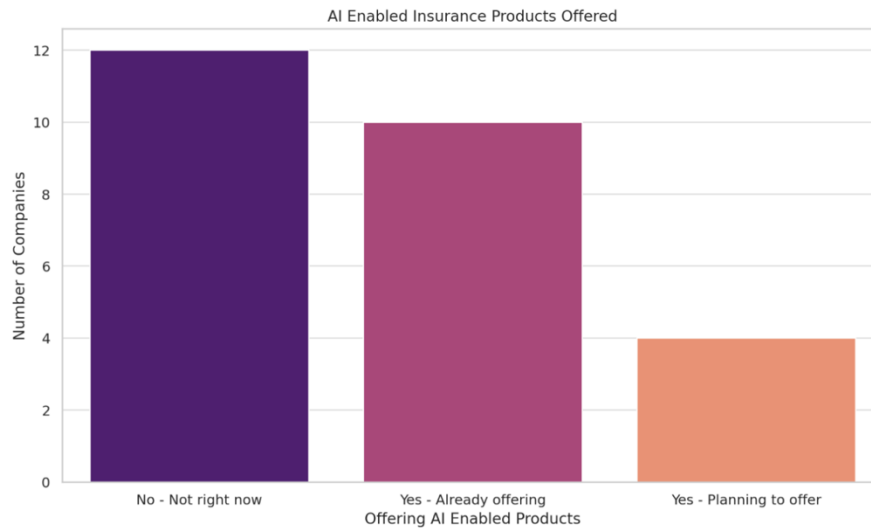
Figure-6: Analysis visualization of AI enabled insurance products.

In figure 6, this chart illustrates the number of companies that offer insurance products enabled with AI. This indicates how AI technologies are being utilized to enhance or create new insurance products, showcasing the practical application of AI within the industry.

AI Utilization Areas: Identifying the specific areas within companies where AI is utilized, as indicated by the respondents.
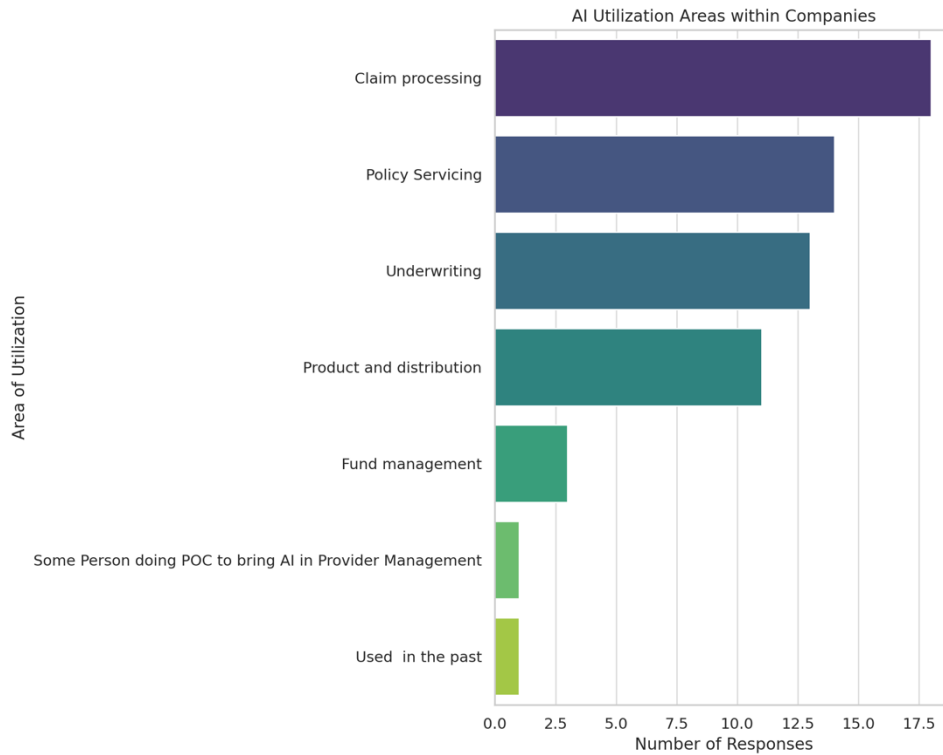
Figure-7: Analysis visualization of AI utilization areas with in companies.

The bar chart above illustrates the various areas within companies where AI is being utilized, as indicated by the survey responses. This chart helps to identify the primary sectors of the insurance industry that are leveraging AI technology for improvements and innovations. Areas of utilization include, but are not limited to, customer service, claims processing, risk assessment, and fraud detection, among others.

Technical Infrastructure Limitation:
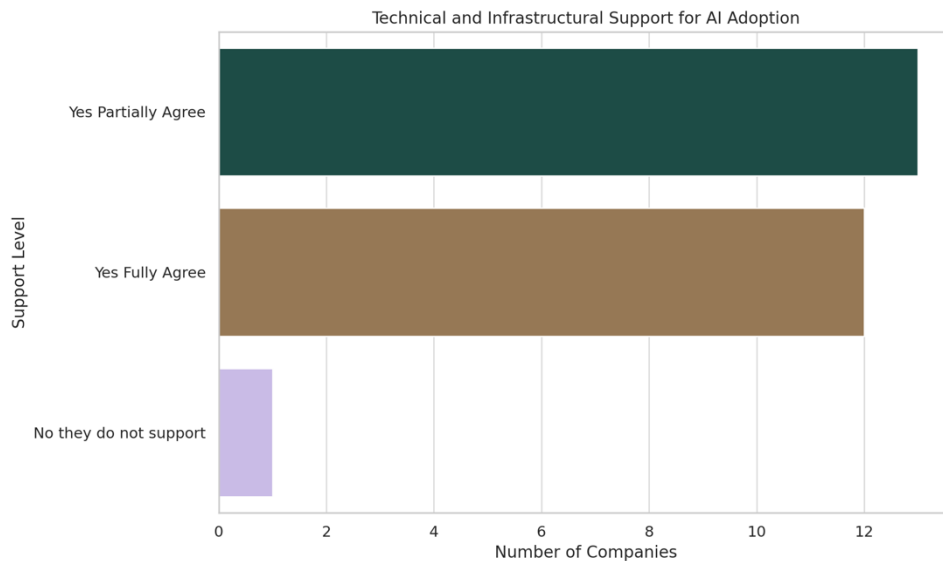
Figure-8: Analysis visualization of technical and Infrastructure support for AI adoption.

The visualization specifically focuses on **Technical and Infrastructural Support for AI Adoption** within companies, showcasing how respondents perceive their organization's current infrastructure in terms of its capability to support the adoption of AI technologies.

This chart reveals the distribution of responses regarding whether companies believe their existing infrastructure is adequate for integrating AI into their operations. The responses range from full support to potential limitations, highlighting the importance of having a robust technical infrastructure as a foundation for successful AI implementation.

This insight is essential for understanding the key challenges in AI adoption. It underscores the need for companies, especially in the insurance sector, to assess and potentially upgrade

their infrastructure to fully leverage AI technologies. This can help in investing in hardware, software, and networking capabilities that are enablers to AI-driven processes and analytics.

Cost Implications of AI Adoption: This chart illustrates how companies have considered AI adoption within their long-term financial planning and strategy. It indicates the level of financial preparedness and investment planning among companies regarding AI initiatives.
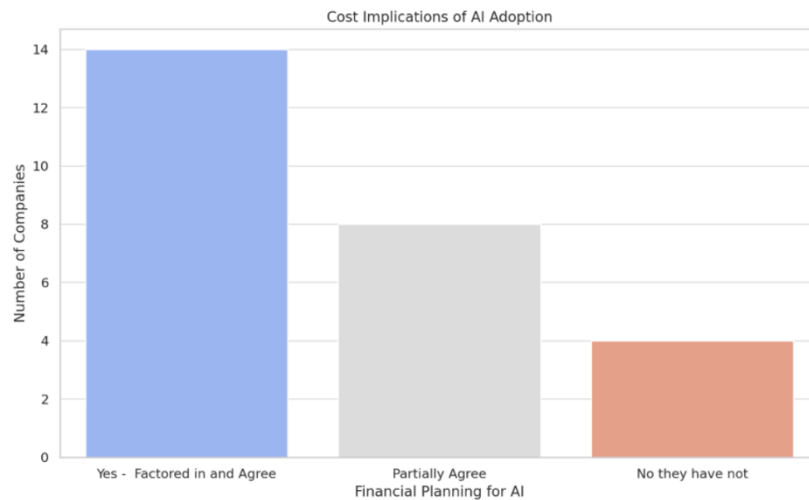
Figure-9: Analysis visualization of cost implications of AI adoption.

Skill Gaps and Workforce Readiness: The second visualization highlights the strategies companies have in place to address skill gaps and enhance workforce readiness for AI. It shows whether companies are focusing on training existing staff, hiring new talent, or both, to build a workforce capable of supporting AI technologies.
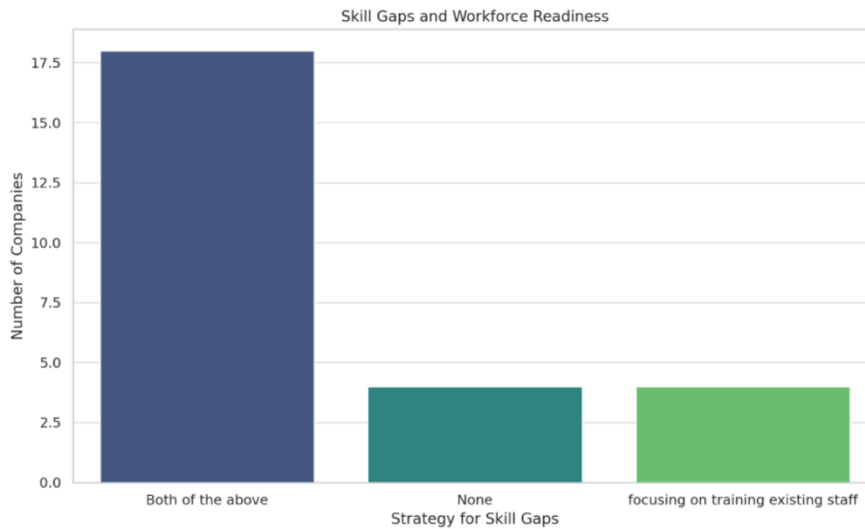
Figure-10: Analysis visualization of Skill Gaps and Workforce readiness.

Customer Acceptance and Trust in AI: The final chart depicts strategies around ensuring transparency in AI-driven decisions to build trust among customers. This reflects the efforts made by companies to address potential concerns about AI, emphasizing the importance of transparency and trust in customer relationships.
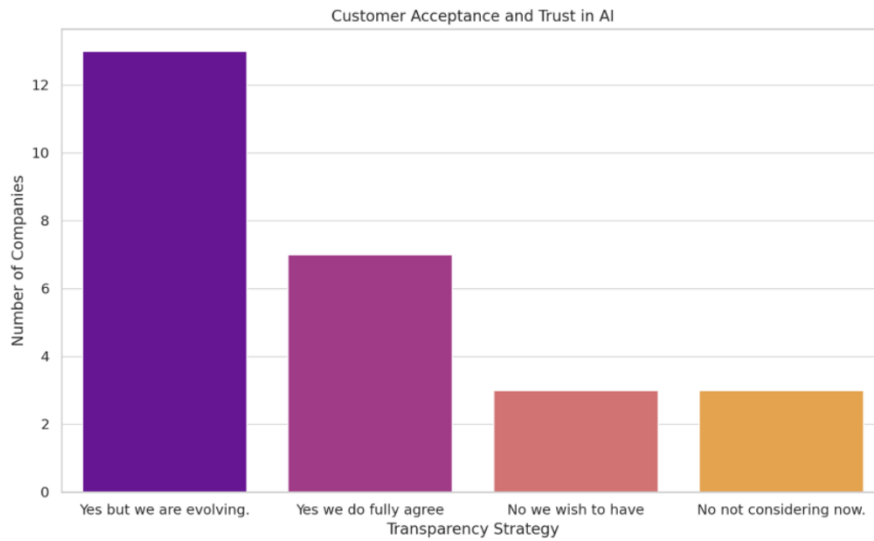
Figure-11: Analysis visualization of customer acceptance and Trust in AI.

Regulatory Challenges: We will summarize the impact of regulations on AI deployment strategies.
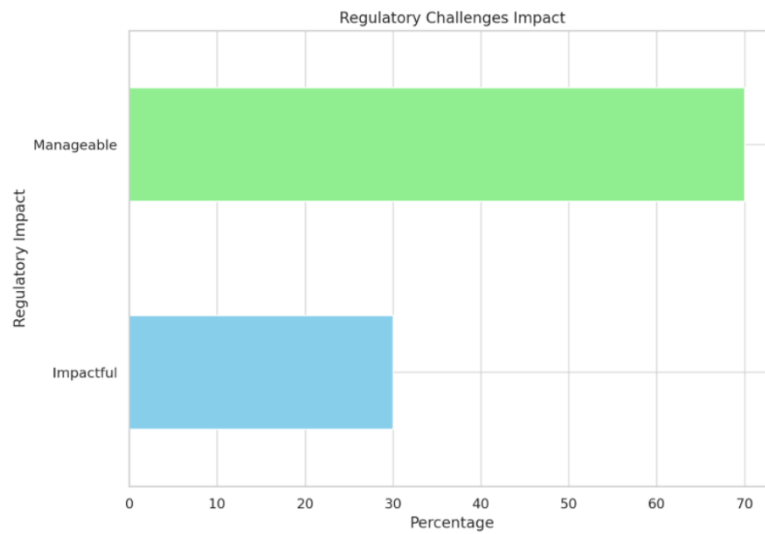
Figure-12: Analysis visualization of Regulatory challenges Impact.

This chart in fig 12, hypothetically illustrates the impact of regulatory challenges on AI deployment strategies, distinguishing between companies that find regulations impactful and those that consider them manageable. It underscores the importance of navigating regulatory environments effectively to implement AI.

4.2 Research Question Two

How are customers responding to AI enabled insurance products and services and their acceptance of AI enabled products?

Data Overview

As part of the quantitative research following details are defined as part of the survey and captured the responses for the following questions:

- **Age Group**: Categorizes respondents by age.

- **Gender**: Respondent's gender.

- **Country**: The country where the respondents have purchased insurance products.

- **Trust in AI Recommendations**: The level of trust respondents place in AI recommendations for insurance products.

- **AI Recommendation Purchase**: Indicates whether respondents have purchased insurance products recommended online by AI.

- **Satisfaction with AI-Recommended Products**: Respondents' satisfaction level with insurance products recommended by AI.

- **AI's Effect on Insurance Purchasing Experience**: How AI influences respondents' overall experience of purchasing insurance products.

- **Recommendation of AI-Recommended Products**: Whether respondents would recommend AI-recommended insurance products to others.

- **Email**: (Optional) For sharing the final research outcome.

In this section let us analyze the survey about consumers' perceptions and experiences with AI-recommended insurance products. Following are the response data collected as part of the survey – responded age group, gender, country of insurance purchase, trust in AI recommendations, whether the respondent has purchased AI-recommended insurance products, satisfaction with those products, the effect of AI on the insurance purchasing experience, and willingness to recommend AI-recommended products to others.

Have conducted a detailed statistical analysis with clear graphs and charts in this section.

Distribution of respondents by age:
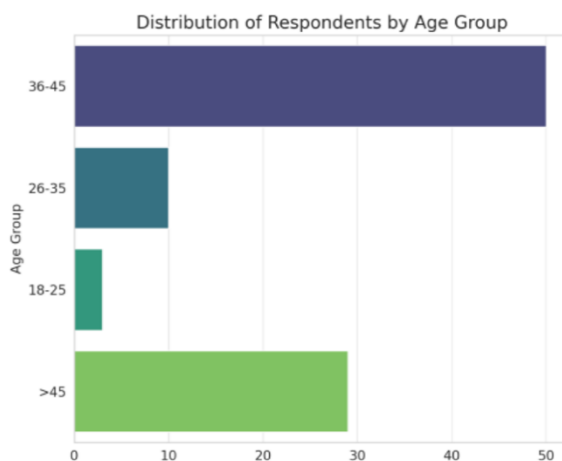
Figure-13: Analysis visualization of distribution of Respondents by Age Group.

The distribution across age groups shows a diversity in the respondents, with a notable concentration in certain age brackets. This diversity indicates the varying levels of comfort and trust in technology across age groups, which can influence perceptions of AI in insurance.

Distribution of respondents by gender:
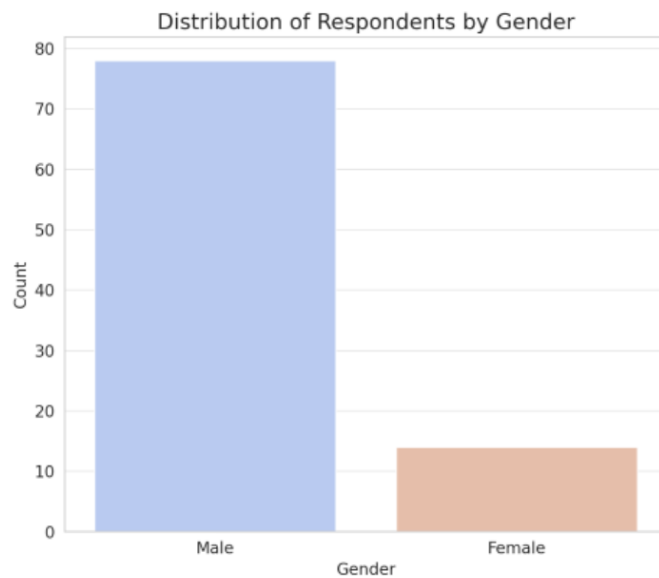
Figure-14: Analysis visualization of distribution of Respondents by Gender

The gender distribution highlights the participation of different genders in the survey. Understanding gender differences in trust and acceptance of AI recommendations can provide insights into tailored communication.

Trust levels in AI recommendations and their relationship with the willingness to purchase AI-recommended insurance products.
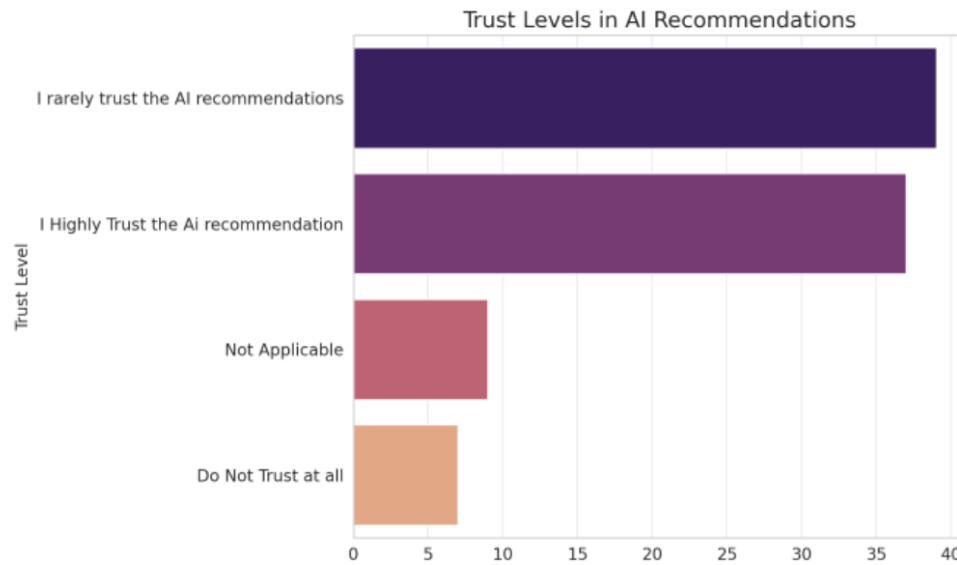
Figure-15: Analysis visualization of distribution of Trust levels in AI recommendation.

The levels of trust in AI recommendations vary significantly among respondents. While some highly trust AI for insurance recommendations, others are more cautious. This variance underscores the importance of building transparent, understandable, and reliable AI systems to enhance trust.

Satisfaction levels with AI-recommended products and their impact on the overall purchasing experience and recommendation willingness.
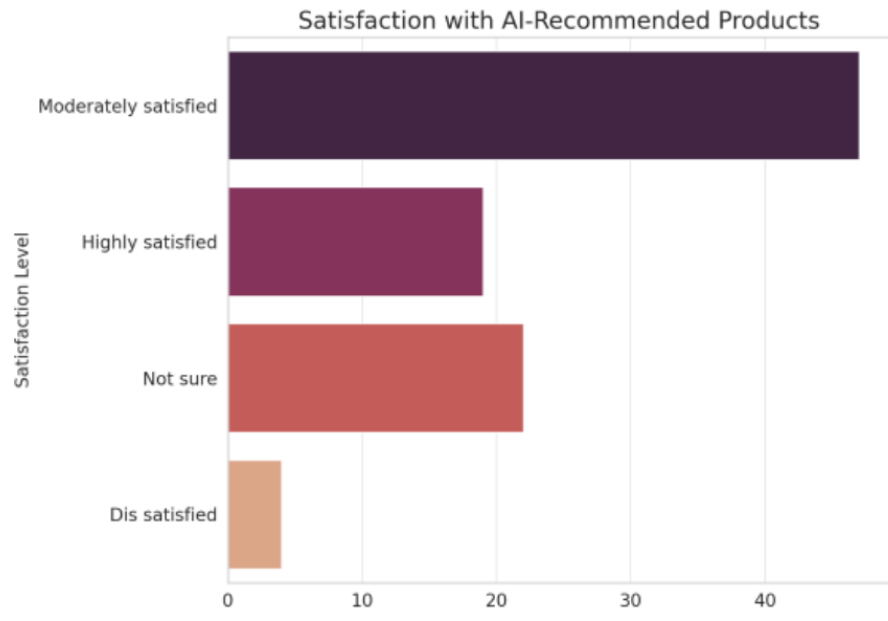
Figure-16: Analysis visualization of distribution of Satisfaction with AI -
Recommended Products

Satisfaction levels with AI-recommended products range from highly satisfied to not satisfied. This spectrum of satisfaction underscores the need for AI systems to accurately understand and match consumer needs and preferences to enhance satisfaction.

Country Distribution of Respondents: Examining the geographic distribution of survey participants to understand regional differences in insurance product purchasing patterns.
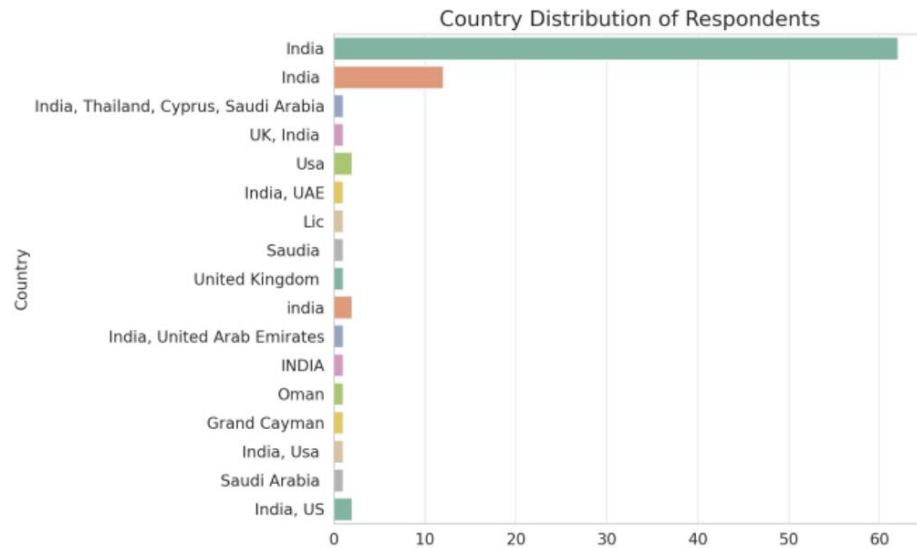
Figure-17: Analysis visualization of distribution of responded based on country

This chart shows the geographic distribution of survey participants, indicating where respondents have purchased insurance products. The distribution highlights the primary countries represented in the survey, which can help them to identify regional patterns in insurance purchasing and attitudes toward AI.

Purchasing Behavior of AI-Recommended Insurance Products: Analyzing the frequency of purchasing behavior among respondents when it comes to AI-recommended insurance products.
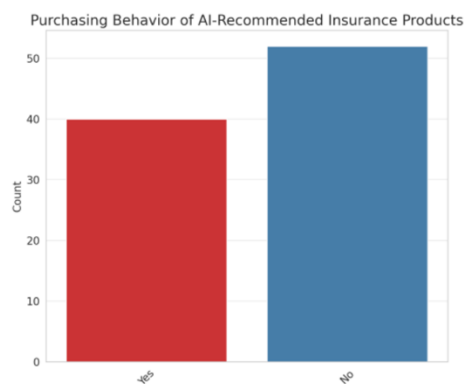
Figure-18: Analysis visualization of distribution purchasing behavior of AI -recommended insurance products

The chart on purchasing behavior reveals how many respondents have purchased insurance products recommended by AI. This information is key to understanding the current adoption rate of AI recommendations in insurance purchasing decisions and highlights areas where insurers can work to increase trust and acceptance of AI recommendations among consumers.

Effect of AI on the Insurance Purchasing Experience: Investigating how the use of AI influences the overall experience of purchasing insurance products, including whether it leads to a more positive, negative, or moderate experience.
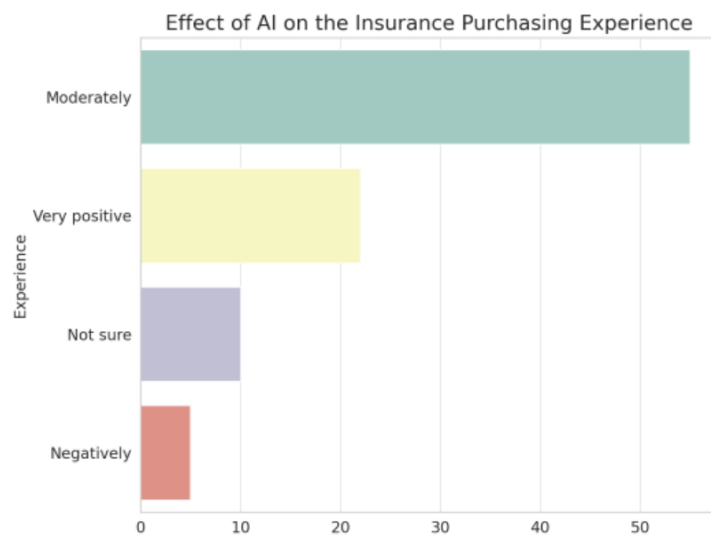
Figure-19: Analysis visualization of distribution of Ai on the insurance purchasing experience

This chart examines respondents' perceptions of how AI affects their overall experience of purchasing insurance products. The variety of experiences—ranging from very positive to moderate—indicates the diverse impact of AI on the purchasing process. For insurers, this

underscores the importance of enhancing AI recommendation systems to ensure a positive purchasing experience for all users.

Willingness to Recommend AI-Recommended Products: Assessing the likelihood of respondents recommending AI-recommended insurance products to others, which can indicate the perceived value and trustworthiness of these recommendations.
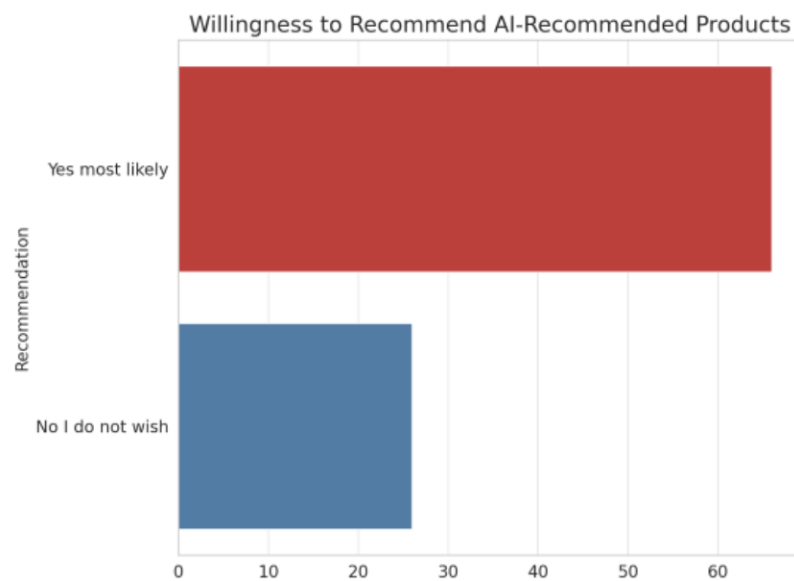
Figure-20: Analysis visualization of distribution of willingness to recommend Ai recommended products

In fig 20, this chart assesses the likelihood of respondents recommending AI-recommended insurance products to others. This willingness to recommend is a crucial indicator of consumer trust and satisfaction with AI recommendations. High levels of willingness to recommend suggest that consumers find value in AI recommendations, while lower levels may indicate areas for improvement.

4.3 Summary of Findings

Specific to the Insurance companies' specific data when we analyzed following are the findings I could infer:

AI's Anticipated Impact on Products and Services: Highlighting expectations around AI's role in creating new or enhancing existing insurance products.
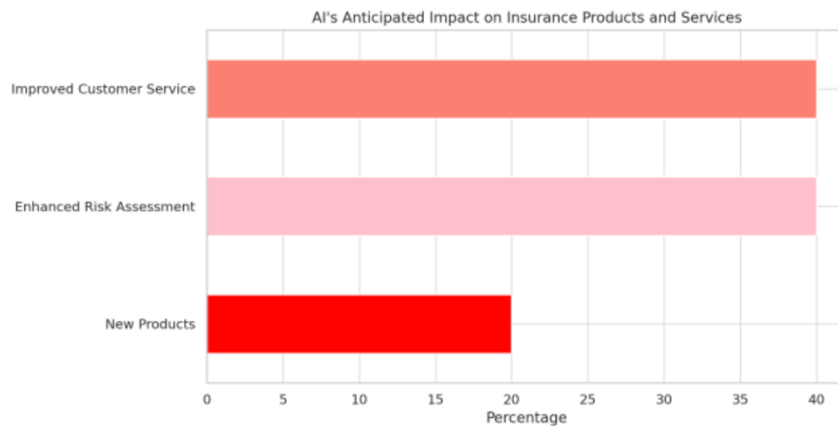
Figure-21: Analysis visualization of distribution of AI's anticipated Impact on Insurance Products and Services

This chart shown in figure 21, highlights the anticipated impact of AI on insurance products and services, including the development of new products, enhanced risk assessment capabilities, and improved customer service. This visualization suggests high expectations for AI's role in driving innovation and enhancing the value proposition of insurance offerings.

Distribution of AI Adoption by Insurance Product Type: Analyzing how AI adoption varies across different types of insurance products (e.g., Auto, Health, Life).
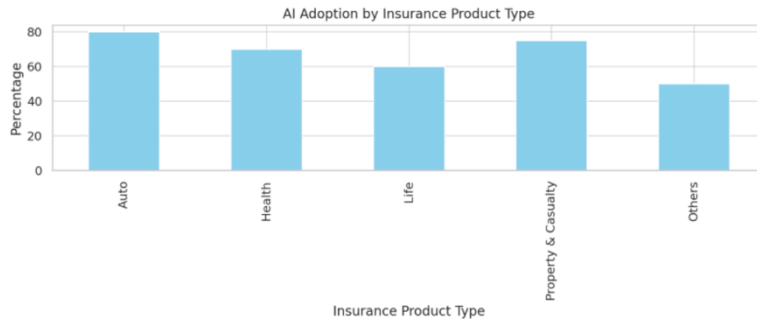
Figure-22: Analysis visualization of AI Adoption by Insurance product Type

This chart shown in fig 22 indicates the distribution of AI adoption across various types of insurance products, with Auto and Property & Casualty insurance seeing higher adoption rates. This suggests that AI technologies have significant applicability in areas with complex risk assessments and large volumes of data, such as auto and property insurance.

Investment Trends in AI Technology: below diagram depicts the levels of investment in AI technology within the insurance sector.
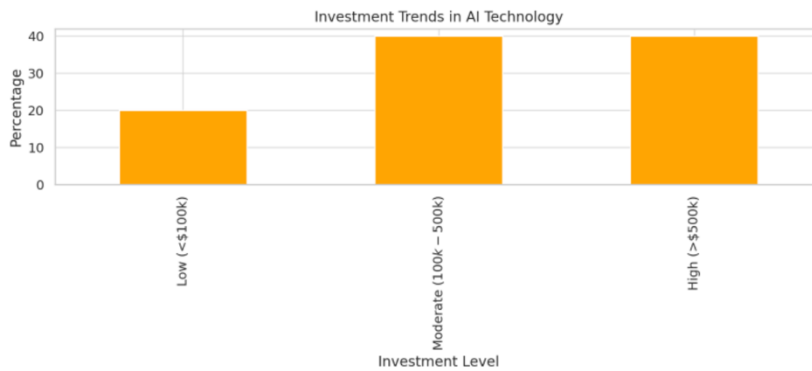
Figure-23: Analysis detailing the Investment Trends in AI Technology

The investment trends chart indicates a balanced distribution between moderate and high investment levels in AI technology within the insurance sector. It details the financial commitment companies are making towards integrating AI into their operations and services, highlighting the importance of AI in driving future growth for the companies.

Benefits of AI Implementation: below diagram and analysis the main benefits companies expect to achieve through AI implementation.
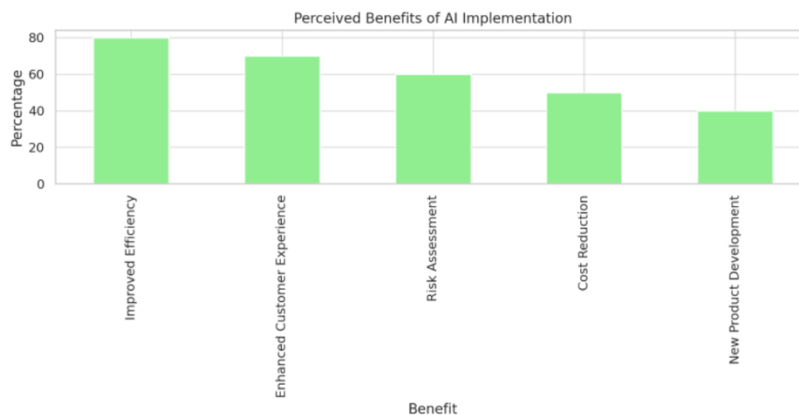
Figure-24: Analysis depicting the perceived benefits of AI implementation

Figure 24 shows the main benefits companies expect from using AI. These include improved efficiency in company operations, better customer experience, and enhanced risk assessment. These benefits show AI's potential to transform important parts of the insurance business, making operations more efficient and responsive to customer needs.

Barriers to AI Adoption: Identifying the primary barriers companies face in adopting AI technology.
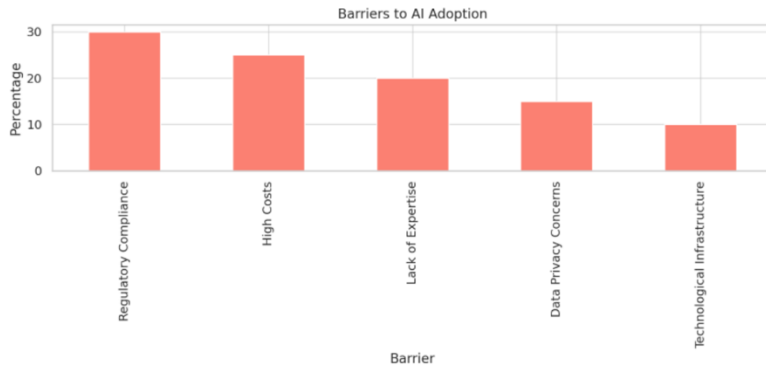
Figure-25: Analysis visualization of barriers to AI adoption

Figure 25 shows the main barriers to adopting AI, with the top challenges being regulatory compliance and high costs. These issues highlight the complexities of implementing AI, including the need for significant financial investment, meeting regulatory requirements, addressing data privacy concerns, and focusing on technology infrastructure for AI implementation.

Customer Acceptance and Trust in AI: Analyzing customer perspectives on AI-driven insurance services.

Figure-26: Analysis detailing the customer acceptance and Trust in AI-driven insurance services.

This chart in fig 26 illustrates the varying levels of customer acceptance towards AI-driven services, with a notable portion highly accepting. It underscores the importance of building trust and demonstrating the value and safety of AI applications to customers.

AI in Fraud Detection and Claims Processing: Highlighting the role of AI in enhancing fraud detection capabilities and streamlining claims processing.
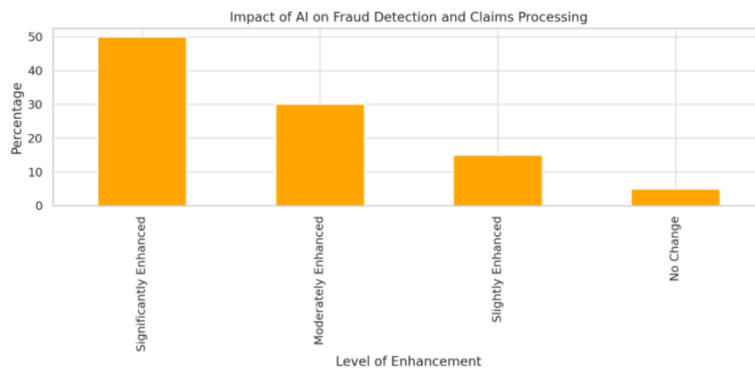
Figure-27: Analysis visualization of AI on Fraud detection and claim processing

The fig 27, Highlights the significant enhancement in fraud detection and claims processing through AI, this visualization reflects AI's potential to improve accuracy and efficiency, benefiting both insurance companies and policyholders.

Specific to the Insurance consumer analysis following are the observation on the survey conducted:

Trust in AI Recommendations by Age Group: Understanding how trust levels vary with age can highlight generational differences in technology adoption and trust.
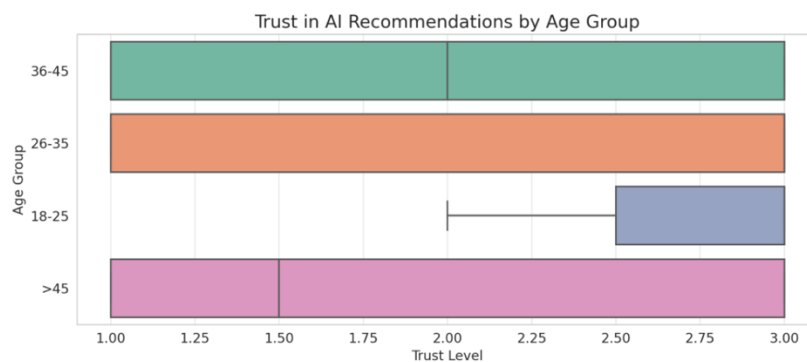
Figure-28: Analysis visualization of AI in Recommendations by Age Group

The boxplot in fig 28, shows the distribution of trust levels in AI recommendations across different age groups. While there is a variance in trust levels within each age group, there doesn't appear to be a clear, consistent trend indicating that one age group trusts AI significantly more or less than others. This suggests that trust in AI is more likely to be influenced by factors other than age, such as personal experience with technology, awareness of AI capabilities, and individual attitudes towards technology and automation in services.

Satisfaction with AI-Recommended Products by Gender: This analysis will reveal if there's a gender-based difference in satisfaction levels, possibly indicating different expectations or experiences between genders.
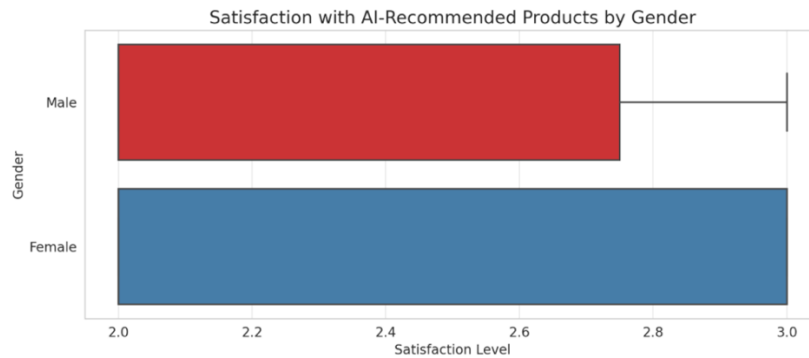
Figure-29: Analysis visualization of Satisfaction with AI-Recommended products by Gender

This analysis in fig 29, reveals the distribution of satisfaction levels with AI-recommended insurance products between genders. Similar to trust levels, satisfaction levels are distributed across the spectrum for both genders, without a stark difference between them. This indicates that both genders are equally likely to find value in AI recommendations, provided the recommendations are accurate, relevant, and personalized.

AI's Effect on Insurance Purchasing Experience by Age Group: Exploring how different age groups perceive the impact of AI on their insurance purchasing experience can offer insights into tailoring AI-driven solutions to better meet the needs of diverse age demographics.
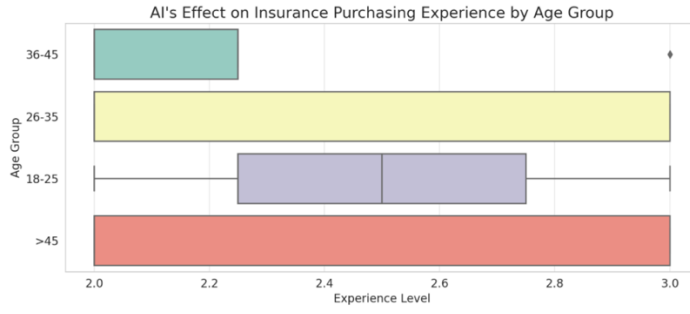
Figure-29: Analysis visualization of Satisfaction with AI-Recommended products by Gender

This analysis explores how the use of AI affects the overall insurance purchasing experience across different age groups. Again, we observe a range of experiences within each age group. The lack of a strong, clear trend across age groups suggests that the impact of AI on the purchasing experience is perceived somewhat consistently across demographics. However, it also underscores the importance of optimizing AI tools to improve user experience universally, rather than focusing on age-specific adjustments.

Country-specific Trust in AI Recommendations: Investigating how trust in AI recommendations varies across countries might reveal cultural or regional differences in technology adoption and trust.
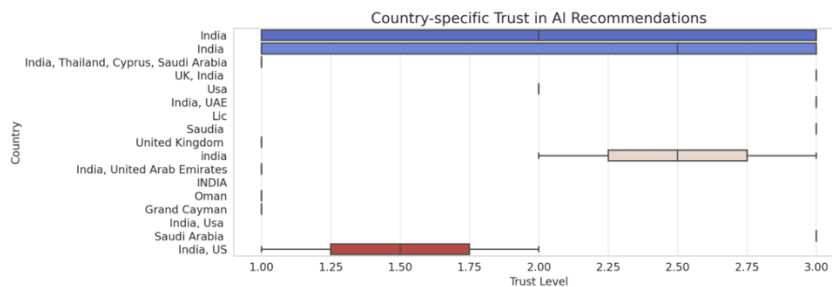
Figure-30: Analysis visualization of country specific trust in AI recommendations

The analysis using boxplot illustrates trust levels in AI recommendations across various countries. While some variation exists between countries, the data suggests that trust in AI for insurance recommendations may be influenced by regional or cultural factors. These factors could include the prevalence of technology, general attitudes towards AI, and historical experiences with digital services.

Purchasing Behavior of AI-Recommended Products by Gender: Understanding if there's a gender difference in the willingness to purchase AI-recommended insurance products could highlight different decision-making processes or trust levels between genders.
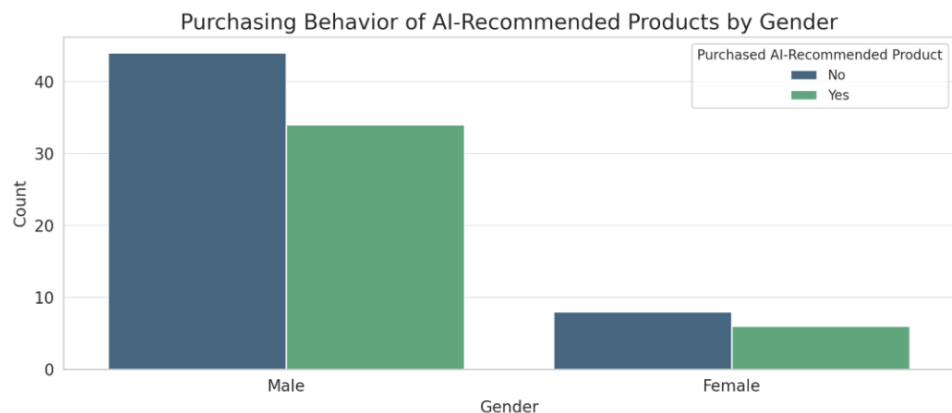
Figure-31: Analysis visualization of Purchasing behavior of AI-recommended products by Gender

in this analysis a count plot was created which indicates the gender distribution of respondents who have purchased AI-recommended insurance products. Both genders show

engagement with AI recommendations, but there might be slight differences in the propensity to follow through on these recommendations. This suggests that while gender may play a role in the decision-making process, both men and women are open to using AI for making insurance decisions, emphasizing the importance of creating gender-neutral, accessible AI tools.

Frequency of AI Recommendation Acceptance by Trust Level: This analysis aims to understand how the frequency of accepting AI recommendations correlates with the level of trust in AI. It will provide insights into whether higher trust leads to more frequent acceptance of recommendations.
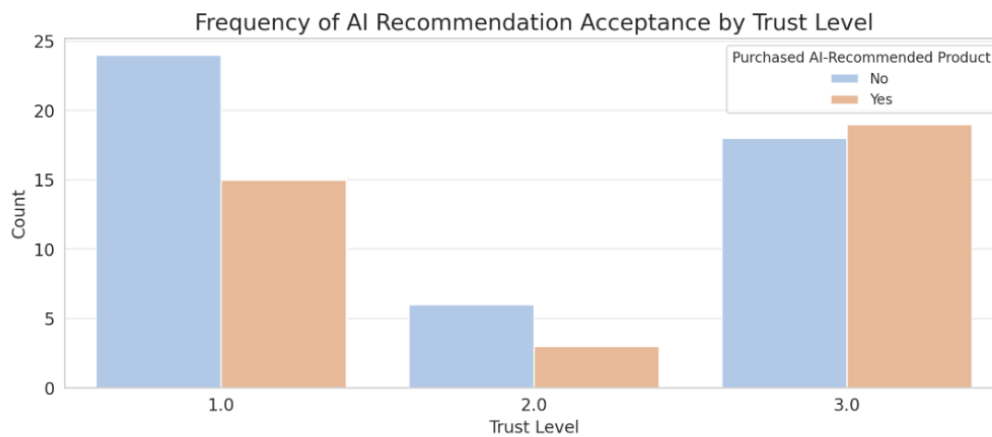
Figure-32: Analysis visualization of frequency of AI-recommendation acceptance by trust level

The count plot shows the correlation between trust levels in AI and the frequency of accepting AI recommendations. As expected, higher trust levels are associated with a greater frequency of purchasing AI-recommended insurance products.

Country-Specific Satisfaction with AI-Recommended Products: In this analysis examined satisfaction levels across different countries. We can identify if certain regions have more positive experiences with AI recommendations than others, this trend is due to regional differences in the availability and quality of AI-driven insurance products and the number of people responded from the region.
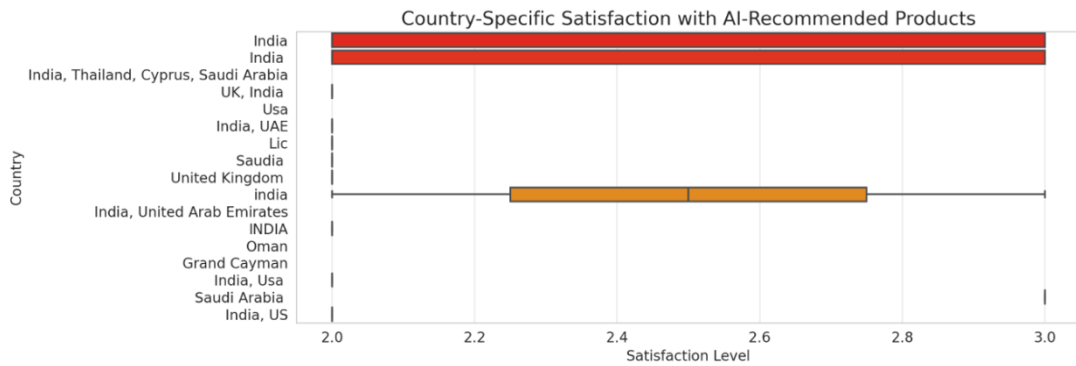
Figure-33: Analysis details of country specific satisfaction with Ai Recommended products

Gender-Specific Views on AI's Effect on the Insurance Purchasing Experience: This analysis will explore if there are noticeable differences between genders in terms of how AI impacts their insurance purchasing experience, providing insights into gender-specific expectations or experiences with AI

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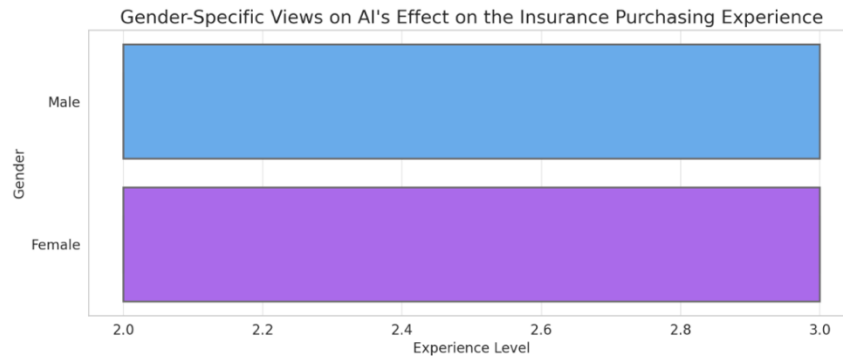
Figure-34: Analysis visualization of Gender specific views on AI's effect on the Insurance purchasing experience

This analysis using boxplot examines how AI affects the insurance purchasing experience from a gender perspective. While there is some variation, the data does not indicate a stark difference between genders. This suggests that the overall perception of AI's impact on the insurance purchasing experience is relatively consistent across genders, emphasizing the importance of focusing on universal improvements to AI systems to enhance the purchasing experience for all users.

Interaction Between Age Group and Willingness to Recommend AI-Recommended Products: This analysis will investigate how different age groups' willingness to recommend AI-recommended products varies, offering insights into generational differences in attitudes towards AI in insurance.
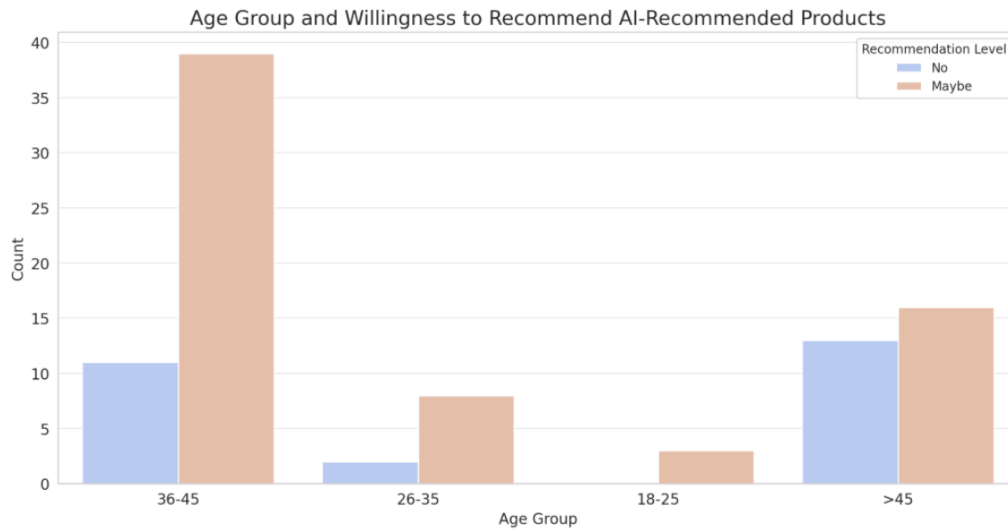
Figure-35: Analysis visualization of Age group and willingness to recommend AI-recommended products

Analysis using count plot illustrates how the willingness to recommend AI-recommended products varies across different age groups. This visualization suggests that there might be generational differences in attitudes toward AI in insurance.

Trust and satisfaction level of AI Recommendations impacted by the Gender: By examining trust and satisfaction levels in AI-recommended insurance products between genders, we can identify potential differences in perceptions and experiences that may help in positioning AI based products to customers.
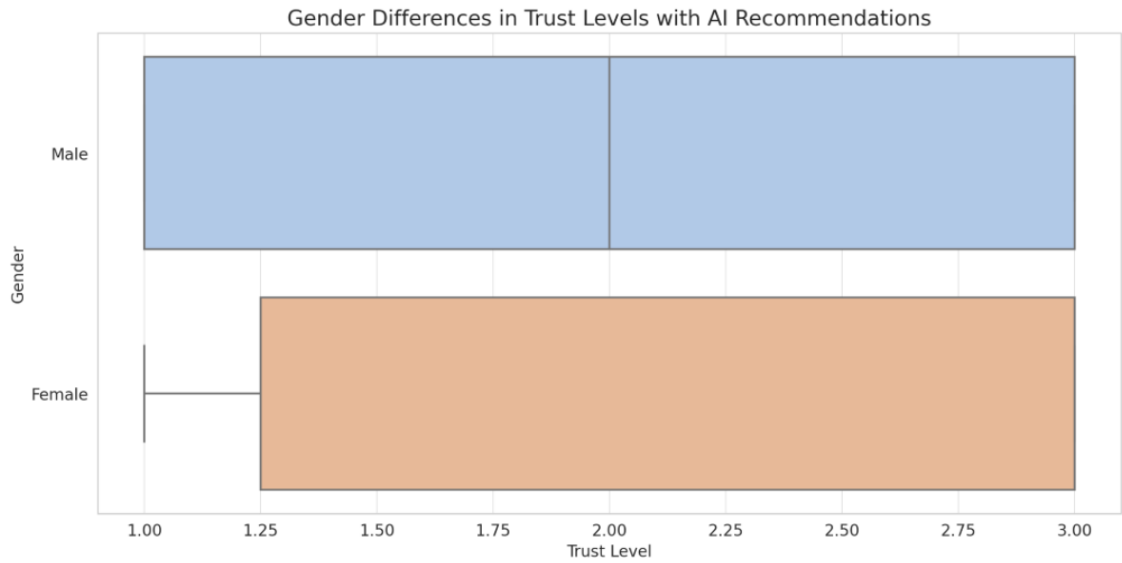
Figure-36: Analysis details of gender differences in Trust levels with Ai recommendations

In fig 36, analysis using boxplot reveals potential gender differences in trust levels in AI recommendations. The plot is representing how trust may vary between genders.

AI's Impact on Insurance Purchasing Experience by Country: In this analysis we explore how respondents from different countries are responding to AI's impact on their insurance purchasing experience. This can provide valuable insights into how different country based respondents influence the adoption and effectiveness of AI-driven solutions.
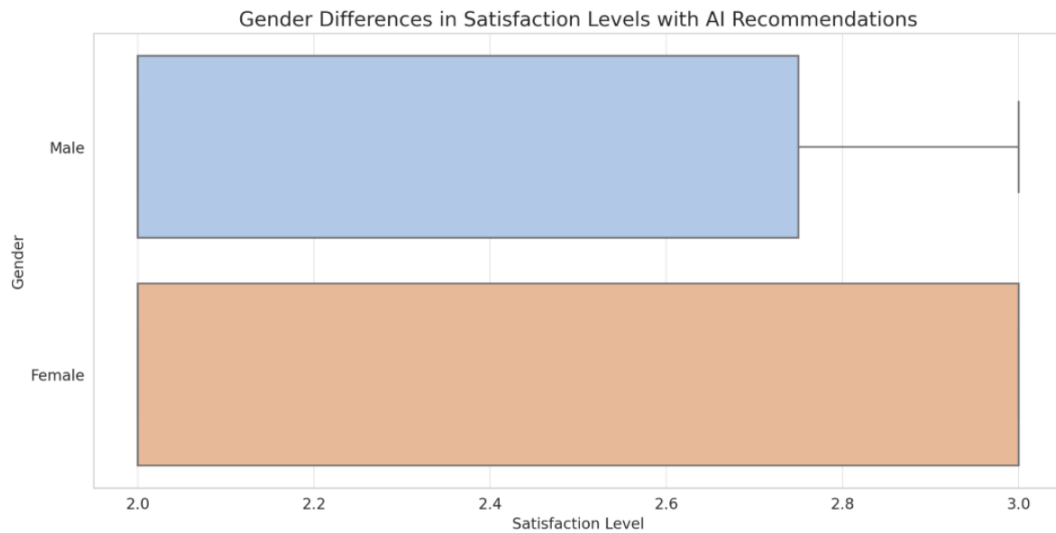
Figure-37: Analysis details of gender differences in satisfaction levels with AI recommendations

In fig 37, Analysis using boxplot details the satisfaction levels on the Insurance AI recommendations between male and female. These differences is important for insurers focusing on enhancing their product delivery and satisfaction.

Relationship Between Trust in AI recommended Insurance and respondent Country-Specific Purchasing Behavior: This analysis examines if there's a correlation between the level of trust on AI recommended Insurance products and respondents trust in AI and their willingness to purchase AI-recommended insurance products in different countries.
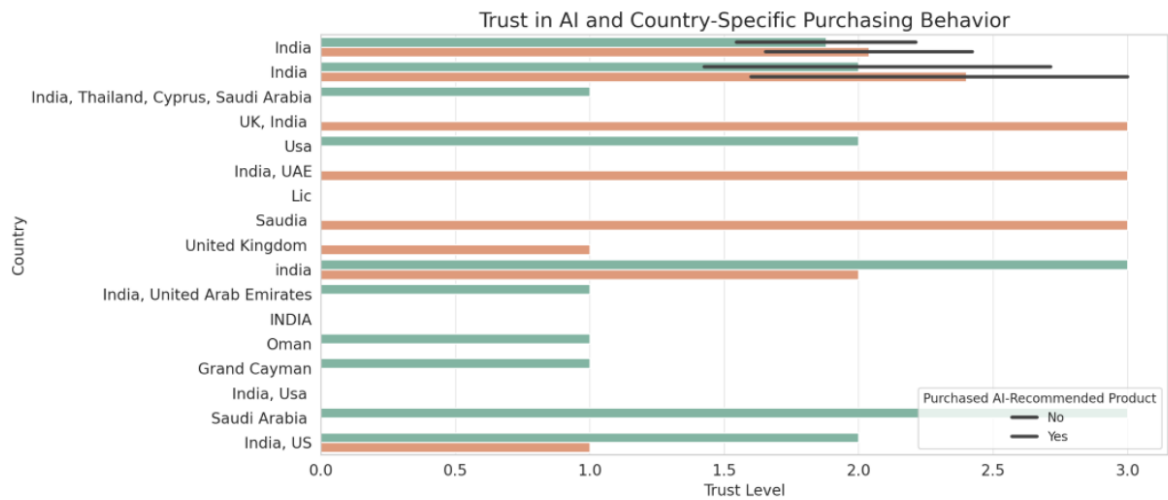
Figure-38: Analysis details of Trust in AI and country-specific purchasing behavior

In fig 38, analysis using bar plot illustrates the relationship between trust in AI and purchasing behavior across different countries. It shows variations in trust levels and their correlation with the likelihood of purchasing AI-recommended products. Analysis implies the importance for insurers to tailor their AI strategies to meet the unique needs and concerns of consumers in each country.

Satisfaction Levels Across Different Age Groups and Genders while purchasing Insurance product: Analyze satisfaction levels with AI-recommended products across different age groups and genders. This will help identify segments that are more or less satisfied, aiding in targeted improvements.

Figure-39: Analysis of detailed satisfaction levels across age groups and genders for Insurance purcahse

Using a categorical plot (catplot) to analyze satisfaction levels with AI-recommended products across different age groups and genders provides a detailed view of these dynamics. This layered analysis can help identify specific segments that are almost satisfied, guiding targeted improvements and personalized marketing strategies. By understanding these dynamics, insurers can better address the specific expectations and experiences of each demographic segment, potentially enhancing overall satisfaction with AI-driven services.

4.4 Conclusion

Based on the comprehensive analysis, the following conclusions can be drawn regarding consumers' perceptions and experiences with AI-recommended insurance products:

Trust and Adoption of AI Recommendations

Diverse Trust Levels: The trust in AI recommendations varies among

Consumers regardless of their age group. Other than age consideration like personal experiences, awareness of AI and individual attitudes towards technology influence the adoption.

Influence of Trust on Purchasing Behavior: Frequency of purchasing AI-recommended insurance product is directly corelated to the trust in AI-recommended products. This shows the importance of insurers to focus on building transparent, understandable, and reliable AI systems to increase consumer trust.

Satisfaction with AI-Recommended Products

Variation in Satisfaction Levels: Consumers shows varying levels of satisfaction with AI-recommended insurance products during the survey, indicating a need for AI systems to more accurately understand and match consumer preferences to improve satisfaction.

No Significant Gender Difference in Satisfaction: Based on the accuracy level, relevant products and personalized insurance recommendation research concludes that both genders are equally likely to purchase AI -recommended insurance product.

AI's Effect on Insurance Purchasing Experience

Positive to Moderate Impact: The impact of AI on the insurance purchasing experience ranges from very positive to moderate across different age groups. This highlights the potential of AI to enhance the purchasing experience, provided AI recommendation systems are optimized for universal improvement rather than focusing on age-specific adjustments.

Willingness to Recommend AI-Recommended Products

Generational Differences: Research concludes that there are variations in the generational differences across various age group. Insurance companies to understand these differences can help tailor their product offerings and communication to these generational differences.

Geographic and Cultural Influences

Regional Differences in Trust and Satisfaction: Research concludes that there are variations in Trust levels and satisfaction with AI-recommended insurance products influenced based on country, regulatory, and market-specific factors.

Need for Tailored AI Strategies: Insurers should customize their AI strategies to address the unique needs and concerns of consumers in each region, recognizing that cultural and regulatory environments can greatly influence the adoption and effectiveness of AI-driven solutions.

The comprehensive research among C-level executives offers an in-depth overview of the current state and prospects of artificial intelligence (AI) in the insurance industry. The findings detail the different aspects of AI adoption and implementation across different regions, insurance product types, and the strategic directions of insurance companies. The following section details the conclusion and summarizes the key findings and their implications for the insurance sector.

Key conclusions analyzing the Insurance industry senior leadership survey:

Geographic and Role Distribution: The survey analyzed responses from a diverse geographic distribution. Most respondents are from the IT and technology leadership within insurance companies.

AI Strategy and Application: Based on research findings majority of insurance companies have established AI strategies - this implies a strategic commitment to integrating AI technologies. AI's applications span across various business functions of Insurance companies including customer service, claims processing, risk assessment, and fraud detection, showing AI's potential to revolutionize these areas.

Infrastructure and Financial Planning: Responses indicate the concerns about existing technical infrastructure and financial readiness for AI integration. These indicate the need

for companies to enhance their technical capabilities and incorporate AI adoption within their long-term financial planning to overcome barriers for AI adoption at their companies.

Workforce Development: Companies are addressing AI skill gaps by training existing staff and hiring new talent, this highlights the importance of developing an AI-capable workforce to support AI-driven transformations.

Regulatory and Ethical Considerations: Research identified that data privacy, bias and transparency are significant constraint led to Regulatory and ethical challenges. Insurance companies to focus on these aspects to navigate regulatory landscapes effectively and prioritize ethical AI use.

Impact on Products and Customer Experience: AI helps insurance companies create new insurance products offering and enhancing existing ones. Also help improve the risk assessment and customer personalization. These developments are expected to drive competitive differentiation and operational excellence for insurance companies adopting AI.

Barriers and Challenges: Regulatory compliance, high costs, and technological infrastructure are identified as primary barriers to AI adoption. On top of that, integrating AI into existing products and departments poses scalability and integration challenges, companies to focus on flexible implementation strategies to address the above concern. Also, there is no maturity models that can help evaluate the insurance companies maturity level on AI adoption.

Strategic Implications:

Enhancing Infrastructure and Financial Planning: Gap in technical infrastructure and financial planning for AI integration could dampen the AI adoption. Insurance companies should prioritize upgrading their technical infrastructure and aligning their financial strategies to support AI initiatives, ensuring they are prepared for seamless AI integration.

Fostering Ethical AI Use: Insurance companies to prioritize the ethical use of AI to address the regulatory compliance challenges and to increase the trust on the AI product to consumers. Insurer to focus on fairness, transparency, and data privacy to build customer trust.

Leveraging AI for Competitive Advantage: AI help insurers to differentiate in the market by developing innovative products and personalize customer experiences.

Addressing Skill Gaps: Insurers need to invest in upskilling their workforce, through training and recruitment, this helps with an AI-ready talent pool that can support the technological advancements.

Navigating Regulatory and Ethical Challenges: Companies must proactively engage with regulatory bodies to ensure whether their AI strategies are compliant and should focus on building internal teams to validate the AI models for their fairness to mitigate risks associated with AI deployment.

Conclusion:

The survey details a complex landscape for AI in the insurance industry. As insurers continue to navigate this evolving challenge, the focus should be on strengthening technical infrastructural and financial foundations, developing the AI skilled workforce, and

adhering to ethical and regulatory standards. Companies should focus on strategic planning and investment in AI with that the insurance industry stands to significantly enhance its product offerings, operational efficiencies, and customer experiences, moving towards a future where AI-driven solutions are integral to achieving industry leadership in the digital age. A key area of focus is identifying the gap created by the absence of a maturity model, which would enable insurers to immediately assess their current AI implementation capabilities and plan accordingly to align AI's impact with their strategic goals.

CHAPTER V
DISCUSSION

5.1 Discussion of Results

Discussion on the Survey Analysis:

Enhance Transparency and Reliability of AI Systems: To increase trust and adoption rates, insurers need to focus on making AI systems more transparent, understandable, and reliable.

Optimize AI to Match Consumer Preferences: AI recommendation systems should be continually improved to accurately match consumer needs and preferences, enhancing overall satisfaction with the recommended products.

Focus on Universal Improvements: Insurers should prioritize universal improvements to the AI-driven purchasing experience rather than making age-specific adjustments, catering to a wider audience.

Tailor Communication and Product Offerings: Understanding generational differences and regional variations can help insurers to tailor their communication and product offerings to better meet the expectations and preferences of different consumer segments.

Adapt Strategies to Regional Differences: Recognizing and adapting to cultural, regulatory, and market-specific differences which can help insurers more effectively deploy AI-driven solutions across different regions.

Un Availability of proper Maturity Models: Availability of maturity models could significantly reduce the time required by the Insurance companies to understand their current state, assess them and plan for remedial action inters of implementing the AI in Insurance.

Focus on Maturity Model: To help insurance companies to address the immediate need to identifying their maturity level this research is proposing a novel framework named

MARAI – Maturity assessment readiness Index for AI in Insurance. With the focus on enabling insurance companies to Assess their current level of maturity inters of application of AI and understand their Gap, priorities the implementation of AI solution based on their strategic priorities. The following discussion will detail the Novel Maturity framework which will help insurance companies to accelerate their AI adoption.

5.2 MARAI Framework Introduction

The insurance sector is rapidly evolving, driven by changes in customer expectations, technological advancements, and the global regulatory landscape. An Insurance Maturity Assessment aims to evaluate the organization's current capabilities and identify areas for improvement to address these challenges effectively. In this brief we will explore key aspects of maturity assessment across four main domains: Enterprise Management and Leadership, Governance and Strategy, Technology, and Business Process, concluding with Operations.

MARAI Framework - **M**aturity **A**ssessment **R**eadiness for **A**I in **I**nsurance
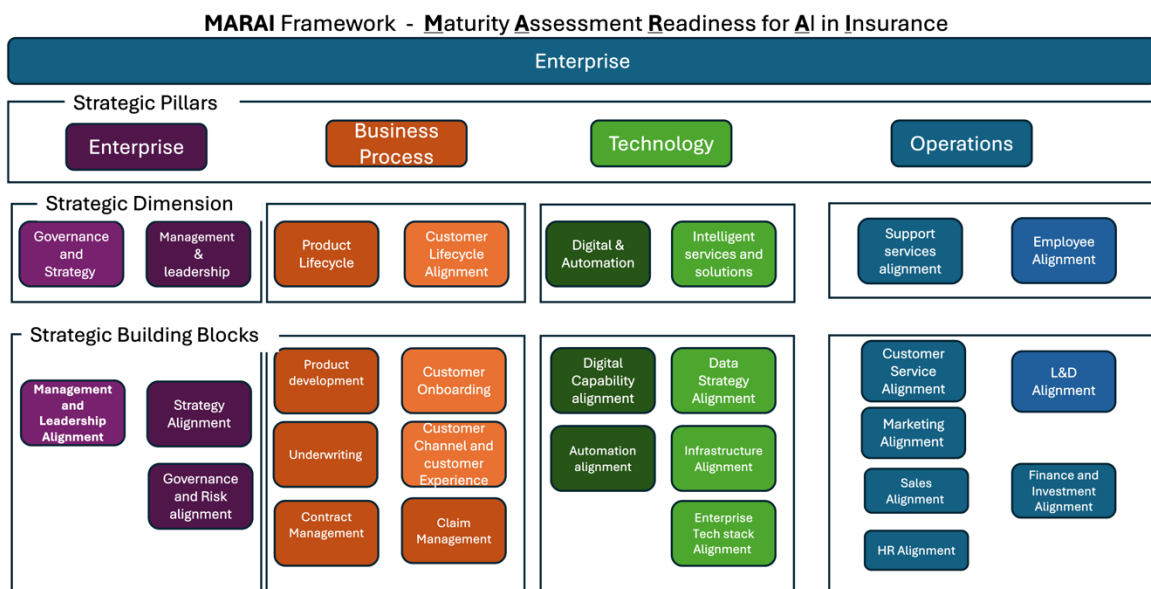
Figure-40: MARAI Framework

5.3 Enterprise Management and Leadership

Management and Leadership Alignment

Effective management and leadership alignment means making sure that all the leaders in an organization have the same vision, goals, and plans. This involves coordinating goals at different management levels and using leadership practices that encourage AI innovation, resilience, and flexibility in AI implementation. In an insurance organization, this alignment is essential for pushing strategic AI initiatives, managing change, and adapting to industry changes. For example, when leaders are aligned on AI focused digital transformation strategies, they can work together to improve customer experiences and make operations more efficient.

5.4 Governance and Strategy

Strategy Alignment

Strategy alignment means making sure that a insurance company's goals match its day-to-day activities and how it uses its resources. For insurance companies, this means that their long-term goals for things like expanding into new markets, offering more AI enabled products, keeping customers happy, and innovating with AI technology should be reflected in their yearly plans, project selections, and each employee's goals.

Governance and Risk Alignment

Governance and risk alignment means including risk management in the way a company is run to find, assess, and reduce risks that might affect its goals. This involves setting clear roles, responsibilities, and processes for managing risks and making sure that risks are

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considered in decision-making at all levels of the organization. Risk management plays an important role in enabling AI focused transformation initiatives.

5.5 Technology

Digital and Automation

Digital Capability Alignment

Digital capability alignment checks how well a company's digital efforts support its strategic goals. This includes using new technologies like AI to improve products, engage with customers, and make operations smoother. For example, using chatbots for customer service can greatly improve customer experience and make operations more efficient.

Automation Alignment

Automation alignment looks at how well AI enabled automation technologies are used to make processes smoother and reduce the need for manual work. This is especially important in areas like underwriting and claims processing, where automation can lead to faster service and fewer errors.

Intelligent Services and Solutions

Data Strategy Alignment

Data strategy alignment means ensuring that a company's data management, structure, and analysis support its goals. Good data management helps insurance companies gain useful insights, make better decisions, and tailor experiences for customers.

Infrastructure and Enterprise Tech Stack Alignment

Tech stack and Infra plays an important role in the success of AI initiatives. This means making sure the Insurance organization IT infrastructure and technology are scalable, secure, and can support the company's current and future AI enabled digital projects. It needs a strong IT setup that can handle new technologies and manage more data efficiently.

5.6 Business Process

Product and Customer Lifecycle Alignment

Product lifecycle alignment ensures that product development, underwriting, contract management, and claim management are efficient and focused on the customer. Similarly, customer lifecycle alignment aims to make the customer journey smooth and positive from onboarding through various channels.

5.7 Operations

Support Services and Employee Alignment

Support services alignment evaluates the effectiveness of functions such as customer service, marketing, sales, HR, and finance in supporting the organization's objectives. Employee alignment, particularly through learning and development (L&D), ensures that employees are skilled and knowledgeable about the latest trends and practices in the insurance industry, aligning their capabilities with the organization's strategic needs.

1. Technology-> Digital and Automation -> Digital capability alignment

Digital capability alignment details the organization technology capability and experience implementing complex advanced technology.

Category Definition Description:

Table-1: Digital Capability Alignment

Category		Definition
1	None	No clear digital capability inters of implementing advanced and complex digital solutions rather maintains existing digital solutions.
2	Basic	Organization has implemented some basic digital solutions.
3	advanced	Organization has experience implementing advanced digital solutions.
4	Flexible	Organization has mature advanced digital solution on boarding approach.
5	Converged	Organization has a dynamic nature of onboarding and managing complex digital solutions.

2. Technology-> Digital and Automation -> Automation Alignment

Automation capability alignment details the organization technology capability and experience implementing automation use cases across their LOB or value chain.

Category Definition Description:

Table-2: Automation Alignment

Category		Definition
1	None	Organization have not implemented any automation.
2	Basic	Organization has implemented some basic automation initiatives and solutions.
3	advanced	Organization has implemented advanced automation solutions.
4	Flexible	Organization has mature automation integrating multiple process across the organization.
5	Converged	Organization has a dynamic nature of onboarding and managing complex automation solutions.

3. Technology-> Intelligence services and solutions-> Data Strategy alignment

Organization alignment towards a detailed data strategy and data capability enables intelligent application setup.

Category Definition Description:

Table-3: Data Strategy Alignment

Category		Definition
1	None	Organization have not have data strategy and have not implemented a data specific initiatives.
2	Basic	Organization has basic data strategy in-place but has not implemented / started implemented basic data initiatives.
3	advanced	Organization has detailed data strategy in place and has implemented considerable data solutions.
4	Flexible	Organization has mature data strategy and implemented organization wide data initiatives.
5	Converged	Organization has a dynamic nature of data strategy and is updating the same on continues basis along with implementing various latest data initiative across organization.

4. Technology-> Intelligence services and solutions-> infrastructure alignment

Organization infrastructure alignment evaluates and access the Infra-capability across the organization for onboarding advanced Intelligent digital solutions. This includes availability of GPU servers with in Inhouse or utilization of Hybrid / Public cloud infrastructures.

Category Definition Description:

Table-4: Infrastructure Alignment

Category		Definition
1	None	Organization has no infrastructure for onboarding intelligent solutions.
2	Formalized	Organization formalized approach to expand their infrastructure to onboard intelligent solutions.
3	Implemented	Organization has detailed infrastructure capability in place either has inhouse GPU Server capability or has option to utilize the Hybrid cloud infrastructure capability.
4	Dynamic	Organization has mature infrastructure implemented across organization wide has option to dynamically increase / decrease the capacity of both inhouse and external hybrid cloud infrastructure.

5	Adaptiv e	Organization has a dynamic nature of infrastructure and is capable of dynamically adapt the infra requirement utilizing both inhouse servers and external cloud service providers.

5. Business Process-> Product Life cycle alignment -> Product development

Organization utilization of advanced AI and analytics initiative in-terms of product development.

Category Definition Description:

Table-5: Product Development

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for product development.
2	Formal ized	Organization formalized approach to implement the AI or advanced analytics solutions as part of the product development.
3	Imple mented	Organization has implemented some of the AI or advanced analytics solutions as part of the product development.

Category		Definition
4	Dynam ic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their product development initiatives.
5	Adapti ve	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases across organization as part of the product development initiative.

6. Business Process-> Product Life cycle alignment -> Underwriting

Organization utilization of advanced AI and analytics initiative for their Insurance underwriting.

Category Definition Description:

Table-6: Underwriting

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for Insurance underwriting process.
2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the insurance underwriting.

3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the insurance underwriting .
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their insurance underwriting.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases across organization as part of the insurance underwriting.

7. Business Process-> Product Life cycle alignment -> Contract Management

Organization utilization of advanced AI and analytics initiative for their Contract

Management.

Category Definition Description:

Table-7: Contract Management

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for Contract management process.

2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the Contract management .
3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the Contract management.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their Contract management.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases across organization as part of the Contract management.

8. Business Process-> Product Life cycle alignment -> Claim Management

Organization utilization of advanced AI and analytics initiative for their Claim Management.

Category Definition Description:

Table-9: Claim Management

Category		Definition

1	None	Organization has no AI or advanced analytics initiatives for Claim Management.
2	Formalized	Organization formalized approach to implement the AI or advanced analytics solutions as part of the Claim Management.
3	Implemented	Organization has implemented some of the AI or advanced analytics solutions as part of the Claim Management.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their Claim Management.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases across organization as part of the Claim Management.

9. Business Process-> Customer Lifecycle alignment-> Customer Onboarding

Organization as part of their customer lifecycle alignment utilize advanced AI and analytics initiative for their customer onboarding.

Category Definition Description:

Table-10: Customer Onboarding

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for customer onboarding.
2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the customer onboarding.
3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the customer onboarding.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their customer onboarding.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases across organization as part of the customer onboarding.

10. Business Process-> Customer Lifecycle alignment-> Customer channel and customer experience

Organization as part of their customer lifecycle alignment utilize advanced AI and analytics initiative for their customer onboarding.

Category Definition Description:

Table-11: Customer channel and customer experience

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for customer onboarding.
2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the customer onboarding.
3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the customer onboarding.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their customer onboarding.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases across organization as part of the customer onboarding.

11. Operations-> Support service alignment -> Customer service

Organization as part of the insurance operation support service alignment customer service initiatives utilize advanced AI and analytics initiatives.

Category Definition Description:

Table-12: Customer Service

Categor y		Definition
1	None	Organization has no AI or advanced analytics initiatives for customer service.
2	Formalize d	Organization formalized approach to implement the AI or advanced analytics solutions as part of the customer service.
3	Implemen ted	Organization has implemented some of the AI or advanced analytics solutions as part of the customer service.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their customer service.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases are implemented for customer support.

12. Operations-> Support service alignment -> Marketing

Organization as part of the insurance operation support service alignment marketing

initiatives utilize advanced AI and analytics initiatives.

Category Definition Description:

Table-13: Marketing

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for Marketing.
2	Formalized	Organization formalized approach to implement the AI or advanced analytics solutions as part of the Marketing.
3	Implemented	Organization has implemented some of the AI or advanced analytics solutions as part of the marketing.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their marketing.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases are implemented for marketing.

13. Operations-> Support service alignment -> sales

Organization as part of the insurance operation support service alignment sales initiatives utilize advanced AI and Finance and Investment.

Category Definition Description:

Table-14: Sales

Categor y		Definition
1	None	Organization has no AI or advanced analytics initiatives for sales.
2	Formalize d	Organization formalized approach to implement the AI or advanced analytics solutions as part of the sales.
3	Implement ed	Organization has implemented some of the AI or advanced analytics solutions as part of the sales.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their sales.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases are implemented for sales.

14. Operations-> Support service alignment -> Human resources

Organization as part of the insurance operation support service alignment human resource department initiatives utilize advanced AI and analytics initiatives.

Category Definition Description:

Table-15: Human Resources

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for human resource.
2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the human resources.
3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the human resources.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their human resources.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases are implemented for human resources.

15. Operations-> Support service alignment -> Finance and Investment

Organization as part of the insurance operation support service alignment finance and

investment initiatives utilize advanced AI and analytics initiatives.

Category Definition Description:

Table-16: Finance and Investment

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for finance and investment.
2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the finance and investment.
3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the finance and investment.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their finance and investment.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases are implemented for finance and investment.

16. Operations-> Employee alignment -> L&D (Learning and Development)

Organization as part of the insurance operation support service alignment L&D initiatives utilize advanced AI and analytics initiatives.

Category Definition Description:

Table-17: Learning and Development

Category		Definition
1	None	Organization has no AI or advanced analytics initiatives for L&D.
2	Formaliz ed	Organization formalized approach to implement the AI or advanced analytics solutions as part of the L&D.
3	Impleme nted	Organization has implemented some of the AI or advanced analytics solutions as part of the L&D.
4	Dynamic	Organization has mature approach and have implemented multiple AI and Advanced analytics solutions as part of their L&D.
5	Adaptive	Organization has a dynamic nature and continuously adapting the AI and advanced analytics use cases are implemented for L&D.
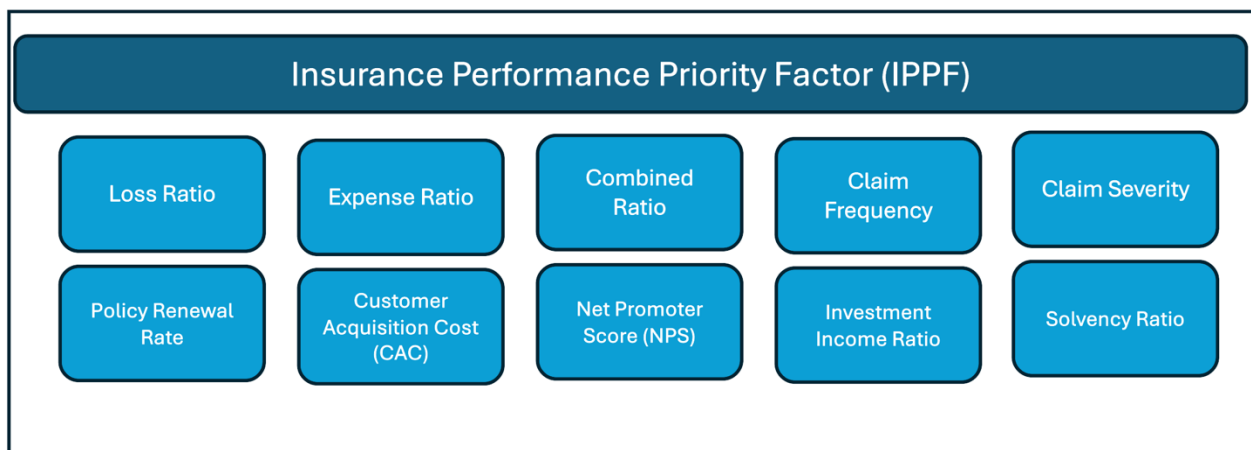
Figure-41: MARAI Framework – insurance performance Priority Factor

Insurance Performance Priority Factor: (IPP Factor)

1. Loss Ratio

The loss ratio measures the percentage of claims paid out to policyholders relative to the

Insurance premiums earned. It is calculated by dividing the total amount of incurred

losses by the total amount of earned premiums.

2. Expense Ratio

Expense ratio measures the insurance company's operational costs in relation to its earned

premium. It is calculated by dividing the company's underwriting expenses by the net

premiums earned.

3. Combined Ratio

Combined ratio adds the loss ratio and the expense ratio together. It's a comprehensive measure of an insurance company's profitability, excluding investment income. A ratio below 100% indicates profitability.

4. Claim Frequency

Claim Frequency measures the number of insurance claims filed over a specific period relative to the number of policies in force at insurance organization. It helps in assessing the risk profile and potential changes in policy pricing or terms.

5. Claim Severity

Claim processing in Insurance represents the payout by the Insurance companies in case of any loss incurred by policy owners which is covered by Insurance. Claim severity measures the average cost per claim, providing insights into the nature and magnitude of the claims being processed by Insurance companies.

6. Policy Renewal Rate

Policy Renewal rate measures the percentage of policyholders who renew their policies at the end of their policy term. High renewal rates indicate customer satisfaction and loyalty. Technology play an important role inters of how well the customer satisfaction is maintained.

7. Customer Acquisition Cost (CAC)

Customer Acquisition cost (CAC) calculates the total cost of acquiring a new customer, including marketing and sales expenses. It's crucial for evaluating the efficiency of acquisition strategies. As an example if an insurance company spends $5 million on marketing and acquires 25,000 new customers, the CAC is $200 per customer.

8. Net Promoter Score (NPS)

Net promoter score (NPS) measures customer satisfaction and loyalty by asking customers how likely they are to recommend the company to others. Scores range from - 100 to 100, with higher scores indicating greater customer loyalty. For example, an insurance company with an NPS score of +50 is considered to have excellent customer loyalty, if their NPS score is in negative meaning customer loyalty is very less and AI and technology can play a crissal role in impacting the NPS score.

9. Investment Income Ratio

Investment income ratio measures the return on investments relative to the earned premiums. Insurance companies invest their premium earned for better return. Better the return can help insurance companies weather their hard years. This ratio helps in understanding how well the company is managing its investment portfolio.

10. Solvency Ratio

Solvency ratio indicates the financial stability of the insurance company by comparing its assets to its liabilities. It's crucial for ensuring the company can meet its long-term obligations. Example: If an insurance company has assets of $500 million and liabilities of $400 million, the solvency ratio is 125%.
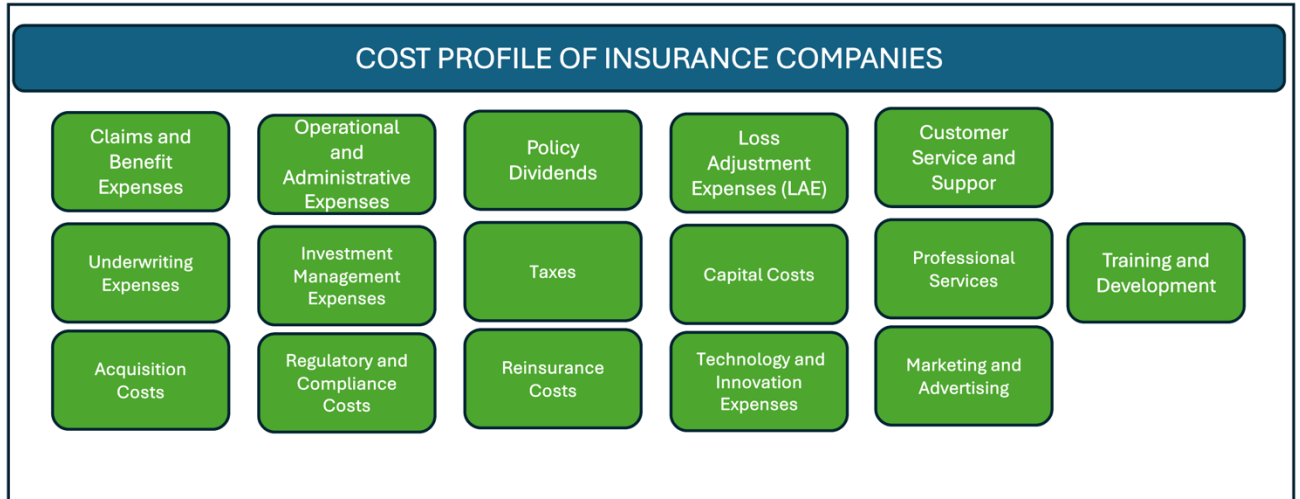
Figure-42: MARAI Framework – Cost Profile of Insurance Companies

COST PROFILE OF INSURANCE COMPANIES:

1. **Claims and Benefit Expenses**

This represents the money paid out to policyholders or beneficiaries in the form of claims or benefits. It's a direct cost related to the core service of insurance.

2. **Underwriting Expenses**

Expenses incurred in the process of selecting, pricing, and issuing insurance policies. This includes costs related to risk assessment, policy issuance, and administrative support.

3. **Acquisition Costs**

Costs associated with acquiring new customers, including marketing, advertising, commissions to agents, and brokerage fees.

4. **Operational and Administrative Expenses**

Costs related to the day-to-day operation of the insurance company, including IT support, salaries for non-sales staff, office rent, utilities, and other administrative expenses.

5. **Investment Management Expenses**

Expenses incurred in managing the company's investment portfolio, including fees for investment managers, transaction costs, and related expenses.

6. **Regulatory and Compliance Costs**

Costs associated with maintaining regulatory compliance, including licensing fees, other related fees specific to regulatory, and expenses related to compliance with legal requirements.

7. **Policy Dividends**

Dividends paid to policyholders from the surplus generated by the insurance operations.

8. **Taxes**

Taxes paid on profits, premium income, or other tax liabilities specific to the insurance industry.

9. **Reinsurance Costs**

Costs associated with purchasing reinsurance to mitigate risk exposure. This includes premiums paid to reinsurers and can vary based on the company's risk management strategy.

10. **Loss Adjustment Expenses (LAE)**

Expenses incurred in the process of investigating, settling, and defending claims. This includes legal fees, adjuster salaries, and other related costs.

11. Capital Costs

Costs related to the capital required to underwrite insurance policies, including interest on debt and the cost of equity capital.

12. Technology and Innovation Expenses

Costs associated with investing in technology and innovation to improve operational efficiency, customer service, and competitive advantage. This includes expenditures on IT infrastructure, digital platforms, and AI enabled innovation projects.

13. Customer Service and Support

Costs related to servicing policyholders, including call centers, online support, and claims assistance. These are critical for maintaining customer satisfaction and loyalty in insurance companies.

14. Professional Services

Fees paid for external professional services such as legal advice, auditing, and consulting. In Many insurance organizations consultants play a critical role. These services support various aspects of the insurance business, from compliance to strategic planning.

15. Marketing and Advertising

Costs associated with brand building, market positioning, and product promotion. This helps to maintain visibility in a competitive market for any Insurance products.

16. Training and Development

Investments in training and professional development for employees to enhance their skills and knowledge. Important for maintaining a knowledgeable workforce capable of delivering high-quality service.

MARAI Framework - **M**aturity **A**ssessment **R**eadiness for **A**I in **I**nsurance				
Insurance Weightage distribution according to Target TimeLine				
S.No	Target timeline	Organization Assessment factor W_{oaf}	Insurance Performance Priority Factor W_{ippf}	Cost profile for Insurance Companies W_{CF}
1	Long Term	20%	40%	40%
2	Medium Term	25%	45%	30%
3	Short Term	15%	30%	55%

Figure-43: MARAI Framework – Insurance weightage distribution according to Target Timeline

Based on the target timeline direction set from the organization the weighting percentage is considered. The weighting is calculated based on the experience level and discussion with the Insurance industry expert for an initial value and the same will be refined in further research for setting proper researched value.

MARAI SCORE:

$$\text{MARAI SCORE} = \sum_{i=1}^{n} W_{IPPF} * \text{IPPF}_i + W_{CF} * \text{ICF}_i + W_{OAF} * \text{OAF}_i$$

W_{IPPF}	- Weight for Insurance performance priority factory
IPPF_i	- Insurance performance priority factory
W_{CF}	- Weight for Insurance Cost Factor
ICF_i	- Insurance Cost Factor
W_{OAF}	- Weight for Organization Assessment Factor
OAF_i	- Organization Assessment Factor

Figure-44: MARAI Framework – MARAI Score

The formula depicted represents the calculation of "MARAI SCORE," for evaluating AI in insurance maturity of an organization.

Insurance Performance Priority Factor (IPPF): Insurance performance priority factory enable companies to priorities the focus area based on their strategy. We have identified 10 specific IPPF to prioritize to enable insurance companies to focus on.

Weight Insurance Performance Priority Factor (W-IPPF): weighted factor for Insurance performance priority based on the organization priority.

Insurance Cost Factor (ICF): Insurance cost factor represents all the cost impact in insurance revenue. There are 16 different items identified for the cost factor.

Weight for Insurance cost factor: The weightage for cost factor varies specific to insurance companies and the details are captured based on companies.

Organization Assessment Factor (OAF): Set of survey questions to identify the current organization maturity level when it comes to the AI in Insurance. As part of the organization assessment 4 strategic base, 8 strategic dimension and 17 strategic building blocks.

Weight for Organization Assessment factor: Weight for the Organization assessment factor enable companies to provide weightage specific to the assessment being done. Currently the weightage is focused on the current organization being accessed but in the future we plan to consolidate the factor detail from across broader set of organization and automatically derive the weights for proper calculation of the MARAI score.

MARAI Score: Based on insurance weight distribution specific to the organization target timeline. Maria score enable companies to understand their current maturity level based on the target time-line they wish to enable AI in Insurance.

MARAI – AI in Insurance Platform:
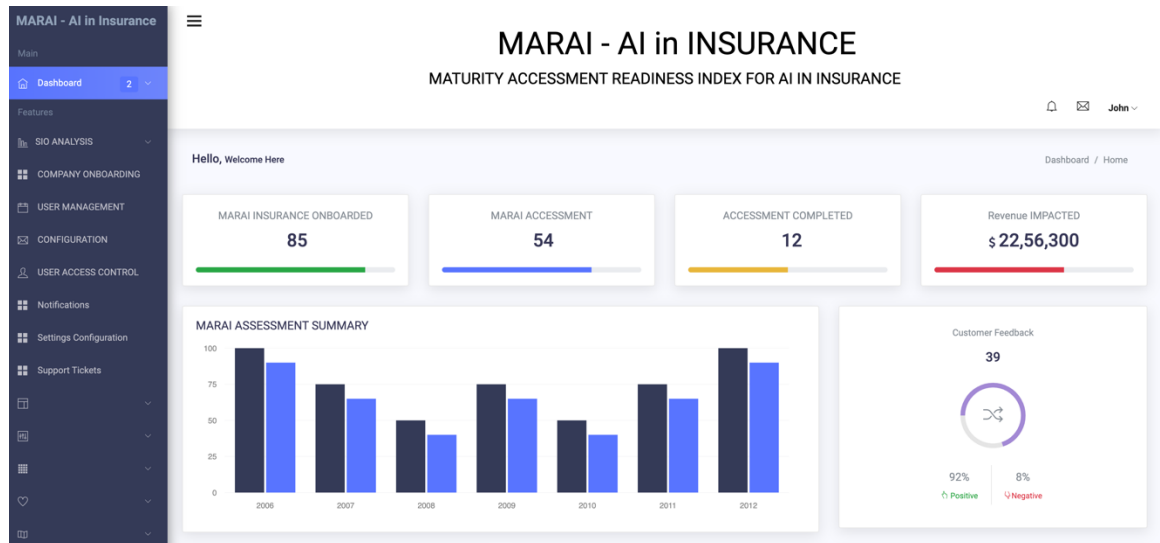
Figure-45: MARAI Platform

Insurance companies are struggling to identify their maturity level and MARAI Framework as mentioned above can help identify the maturity level interns allows them to identify the level and based on which they can plan for implementing the AI solutions. To facilitate the same as part of the research propose a common platform with the following feature:

- Organization Assessment

- Maturity Level identification

- Provide the detailed finding report

- Enable companies to access their current state

- Identify gaps and fix them by incorporating strategies of AI enablement in their organiation.

As a first step towards this goal as part of the research the initial prototye of the platform with the automated assessment feature has been initiated in this research.

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The platform is build using the HTML, CSS and Javascript integrated with Google Forms.
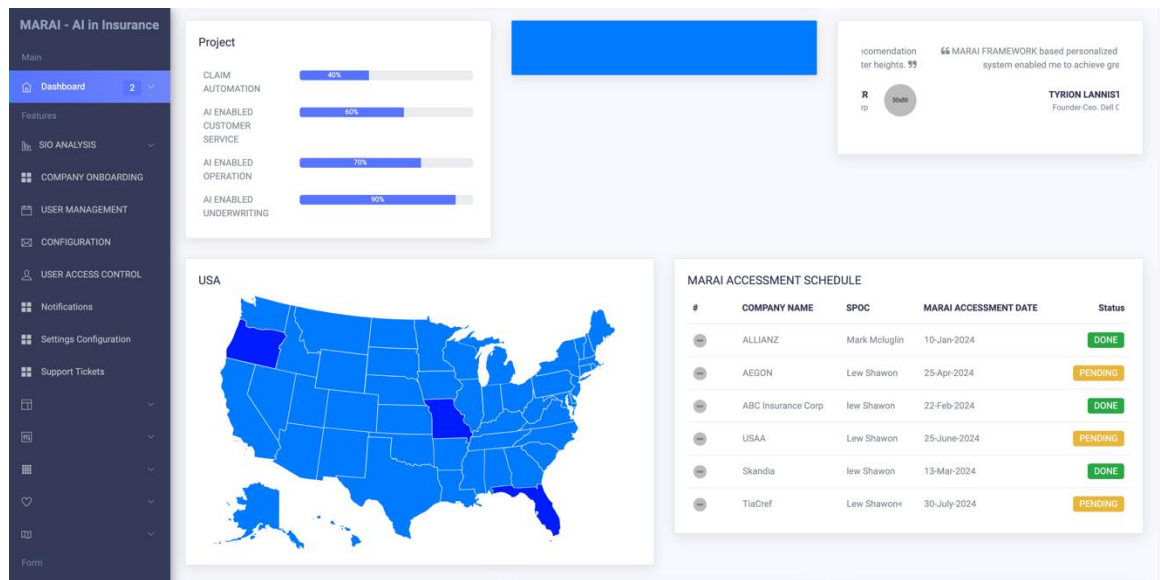
Figure-46: MARAI Platform – Detailed dashboard

Following are the features of the current prototype / platform and the same will be expanded further:

As an intial stage the platform provides a detailed dashboard for visualizing all the various assessment completed. The assessment details are further showcase the details specific to MARAI Assessment planned and completed. MARAI Revenue Impact and various assessment completed and their progress, customer feedback on the assessment, Assessment schedule for the MARAI framework.

Figure-47: MARAI Platform – Insurance Assessment

Figure-48: MARAI Platform – Insurance Assessment - Questionnaire display

MARAI Survey module is integrated with the Google Form which intern enable people to directly access the company performance.

Following are the assessment questions are listed as part of the platform:

Operational -> Employee Alignment -> L&D Alignment *

	Informal	Structured	Continues	Integrated	Adaptive
Learning and Development team in an organization works towards enabling employees knowledge upgradation, workforce capability enhancement to achieve organization goals.	○	○	○	○	○
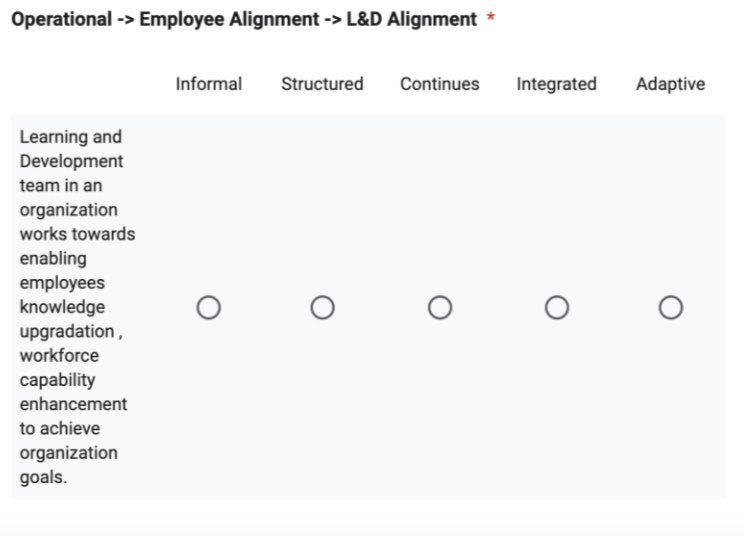
Figure-49: MARAI Platform – Insurance Assessment - Questionnaire 1

Technology-> Intelligence services and solutions-> Enterprise Intelligence *

	Informal	Digitized	Diagnostic	Predictive	Adaptive
Enterprise intelligence defines the approach to process existing data and derive new insights that to lead to creation of new products, applications and services.	○	○	○	○	○
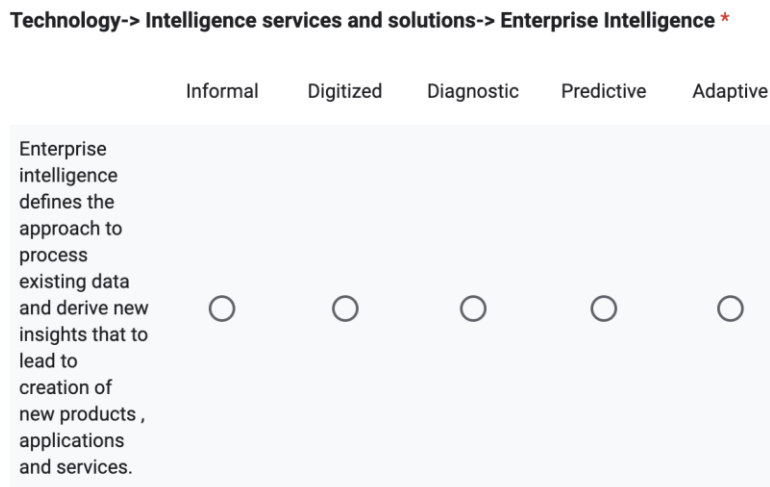
Figure-50: MARAI Platform – Insurance Assessment - Questionnaire 2

Figure-51: MARAI Platform – Insurance Assessment - Questionnaire 3
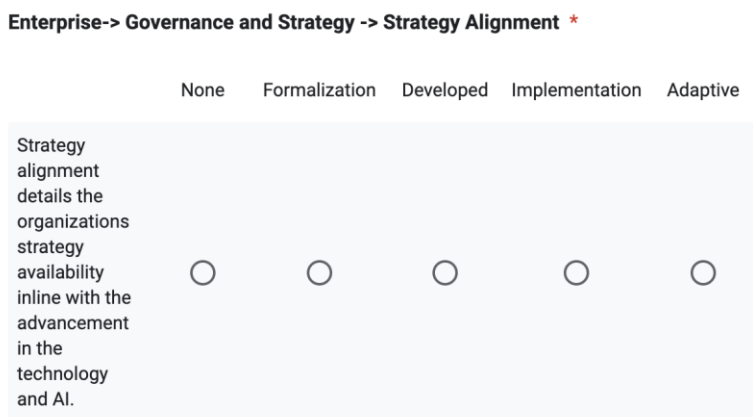
Figure-52: MARAI Platform – Insurance Assessment - Questionnaire 4

Enterprise-> Governance and Strategy -> Governance and Risk alignment *

	None	Formalization	Developed	Implementation	Adaptive
Governance and Risk alignment details organization approach towards governing the implementation of advanced technology and Ai implementation.	○	○	○	○	○
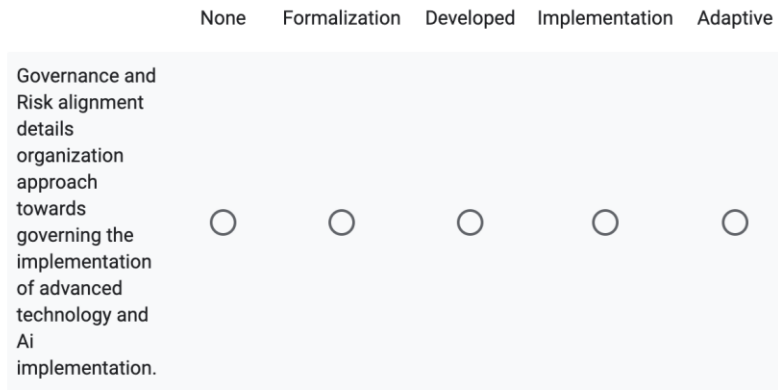
Figure-53: MARAI Platform – Insurance Assessment - Questionnaire 5

Technology-> Digital and Automation -> Digital capability alignment

	None	Basic	advanced	Flexible	Converged
Digital capability alignment details the organization technology capability and experience implementing complex advanced technology.	○	○	○	○	○
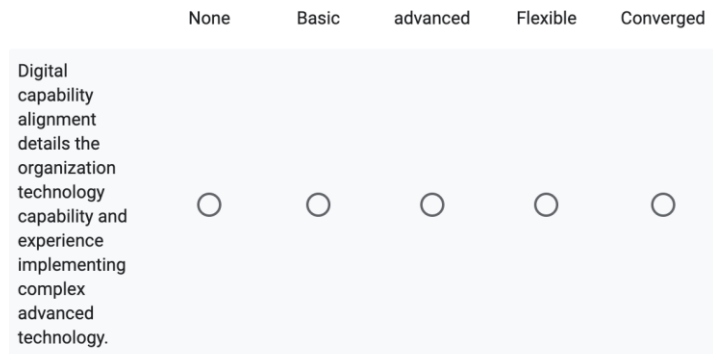
Figure-54: MARAI Platform – Insurance Assessment - Questionnaire 6

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Technology-> Digital and Automation -> Automation Alignment *

	None	Basic	advanced	Flexible	Converged
Automation capability alignment details the organization technology capability and experience implementing automation use cases across their LOB or value chain.	○	○	○	○	○
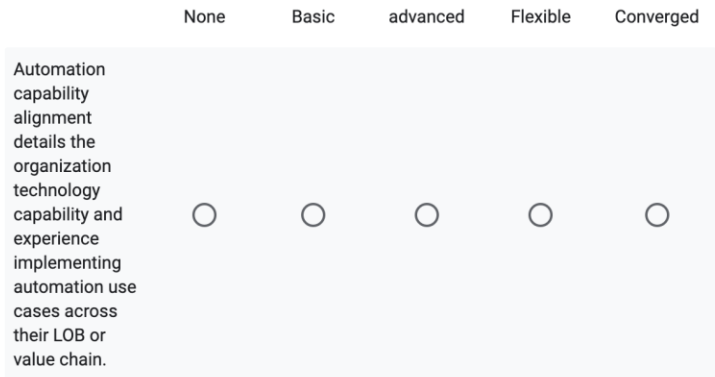
Figure-55: MARAI Platform – Insurance Assessment - Questionnaire 7

Technology-> Intelligence services and solutions-> Data Strategy alignment *

	None	Basic	advanced	Flexible	Converged
Organization alignment towards a detailed data strategy and data capability enables intelligent application setup.	○	○	○	◉	○
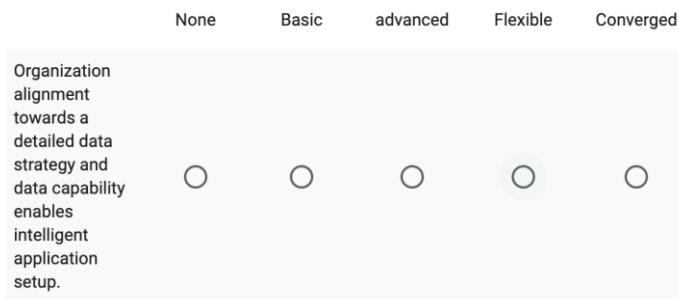
Figure-56: MARAI Platform – Insurance Assessment - Questionnaire 8

Technology-> Intelligence services and solutions-> infrastructure alignment *

	None	Formalized	Implemented	Dynamic	Adaptive
Organization infrastructure alignment evaluates and access the Infra-capability across the organization for onboarding advanced Intelligent digital solutions. This includes availability of GPU servers with in Inhouse or utilization of Hybrid / Public cloud infrastructures.	○	○	○	○	○
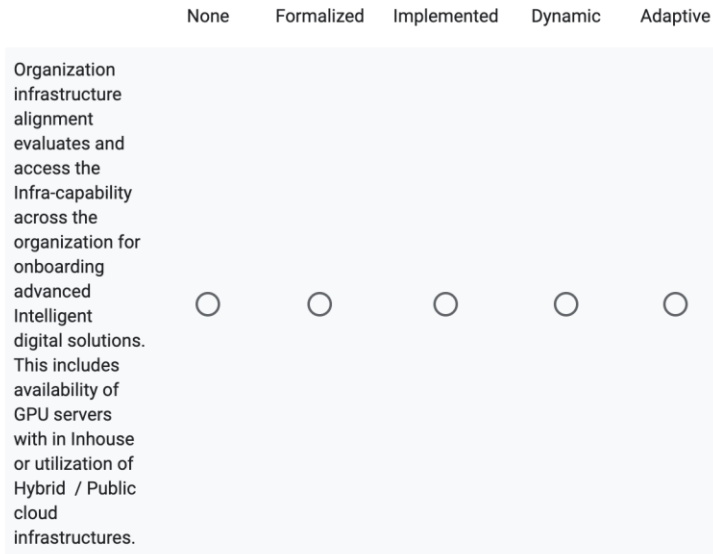
Figure-57: MARAI Platform – Insurance Assessment - Questionnaire 9

Business Process-> Product Life cycle alignment -> Product development *

	None	Formalized	Implemented	Dynamic	Adaptive
Organization utilization of advanced AI and analytics initiative in-terms of product development.	○	○	○	○	○
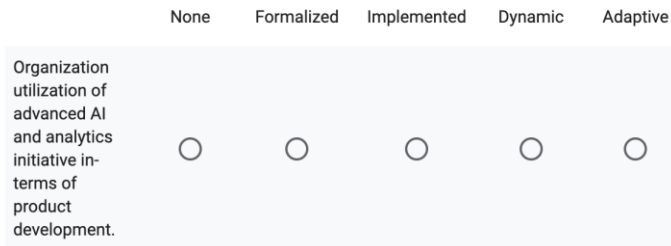
Figure-58: MARAI Platform – Insurance Assessment - Questionnaire 10

Business Process-> Product Life cycle alignment -> Underwriting *

	None	Formalized	Implemented	Dynamic	Adaptive
Organization utilization of advanced AI and analytics initiative for their Insurance underwriting.	○	○	○	○	○
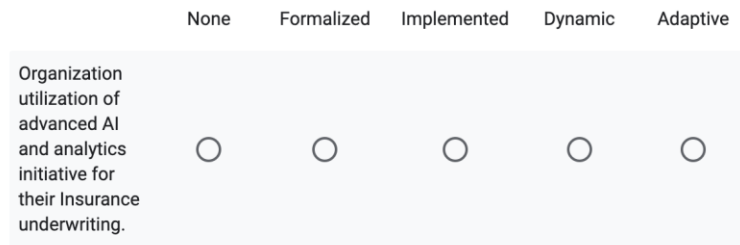
Figure-59: MARAI Platform – Insurance Assessment - Questionnaire 11

Business Process-> Product Life cycle alignment -> Contract Management *

	None	Formalized	Implemented	Dynamic	Adaptive
Organization utilization of advanced AI and analytics initiative for their Contract Management.	○	○	○	○	○
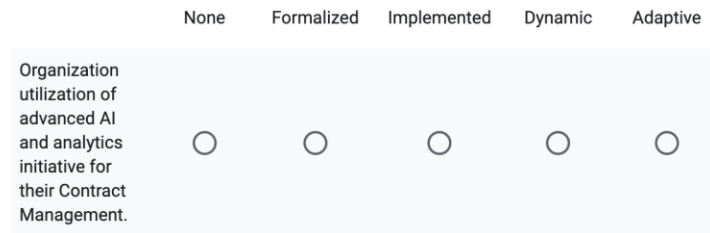
Figure-60: MARAI Platform – Insurance Assessment - Questionnaire 12

Business Process-> Product Life cycle alignment -> Claim Management

	None	Formalized	Implemented	Dynamic	Adaptive
Organization utilization of advanced AI and analytics initiative for their Claim Management.	○	○	○	○	○
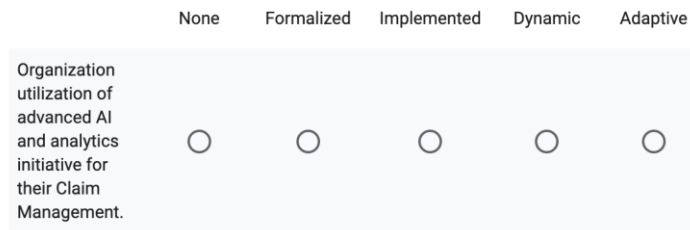
Figure-61: MARAI Platform – Insurance Assessment - Questionnaire 12

Business Process-> Customer Lifecycle alignment-> Customer Onboarding

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of their customer lifecycle alignment utilize advanced AI and analytics initiative for their customer onboarding.	○	○	○	○	○
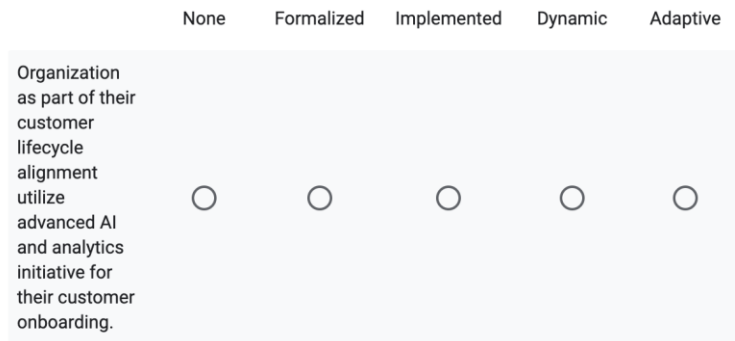
Figure-62: MARAI Platform – Insurance Assessment - Questionnaire 13

Business Process-> Customer Lifecycle alignment-> Customer channel and customer experience

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of their customer lifecycle alignment utilize advanced AI and analytics initiative for their customer onboarding.	○	○	○	○	○
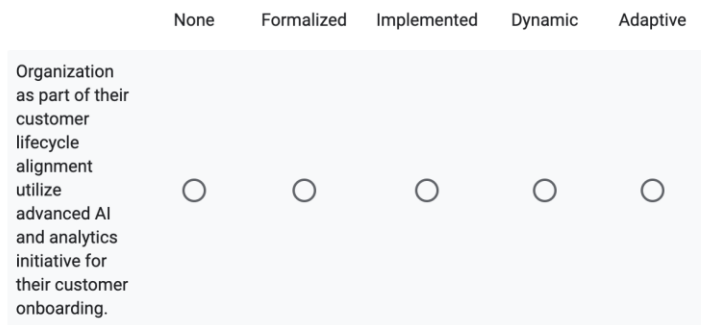
Figure-63: MARAI Platform – Insurance Assessment - Questionnaire 14

Operations-> Support service alignment -> Customer service

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of the insurance operation support service alignment customer service initiatives utilize advanced AI and analytics initiatives.	○	○	○	○	○
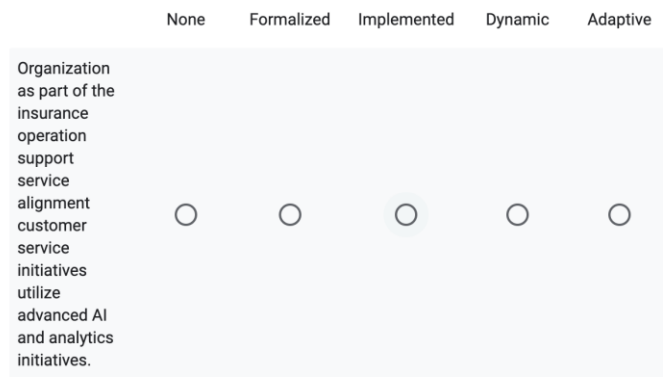
Figure-64: MARAI Platform – Insurance Assessment - Questionnaire 15

Operations-> Support service alignment -> Marketing

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of the insurance operation support service alignment marketing initiatives utilize advanced AI and analytics initiatives.	○	○	○	○	○

Figure-65: MARAI Platform – Insurance Assessment - Questionnaire 16

Operations-> Support service alignment -> sales

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of the insurance operation support service alignment sales initiatives utilize advanced AI and Finance and Investment.	○	○	○	○	○

Figure-66: MARAI Platform – Insurance Assessment - Questionnaire 17

Operations-> Support service alignment -> Human resources

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of the insurance operation support service alignment human resource department initiatives utilize advanced AI and analytics initiatives.	○	○	○	○	○
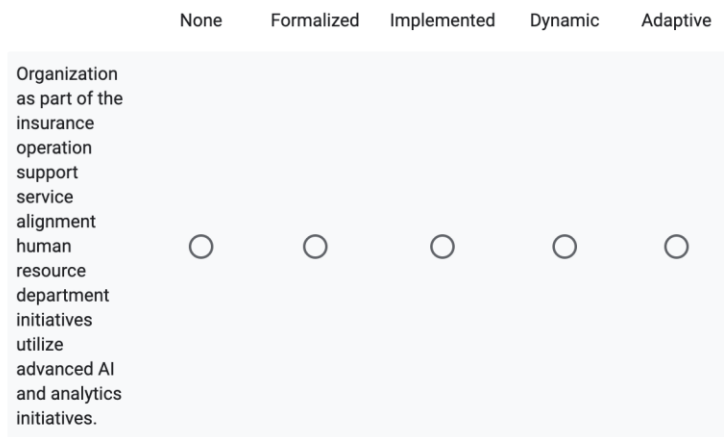
Figure-67: MARAI Platform – Insurance Assessment - Questionnaire 18

Operations-> Support service alignment -> Finance and Investment

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of the insurance operation support service alignment finance and investment initiatives utilize advanced AI and analytics initiatives.	○	○	○	○	○
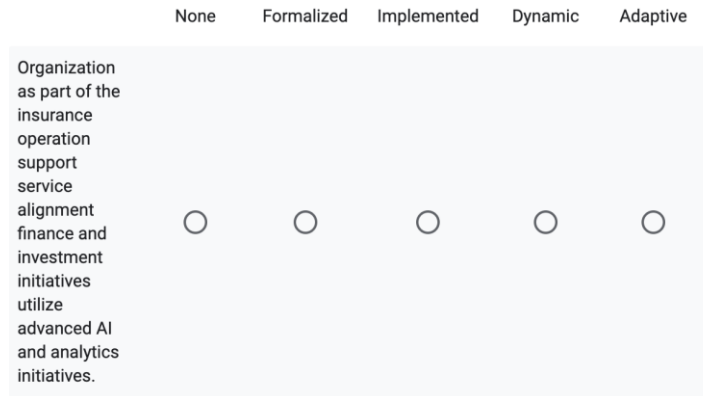
Figure-69: MARAI Platform – Insurance Assessment - Questionnaire 20
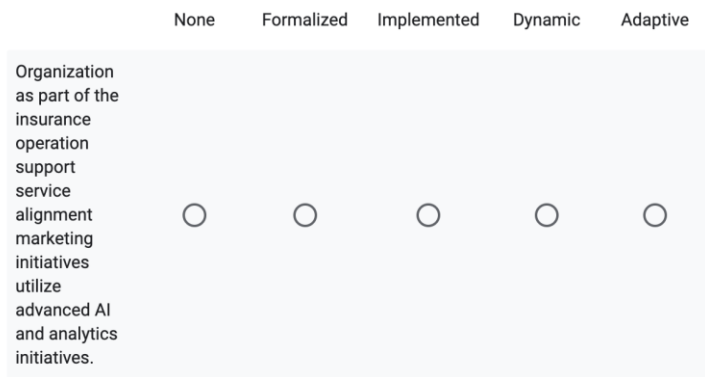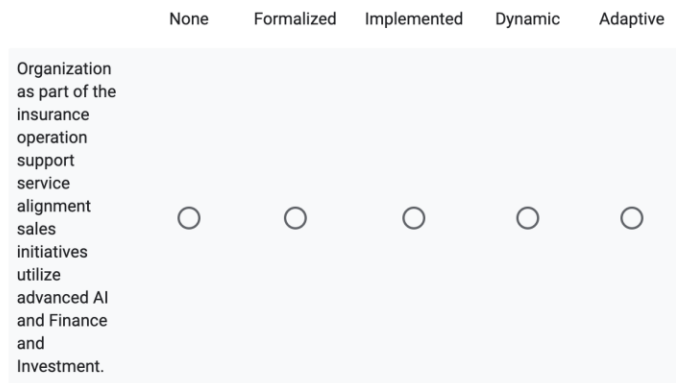
Operations-> Employee alignment -> L&D (Learning and Development)

	None	Formalized	Implemented	Dynamic	Adaptive
Organization as part of the insurance operation support service alignment L&D initiatives utilize advanced AI and analytics initiatives.	○	○	○	○	○
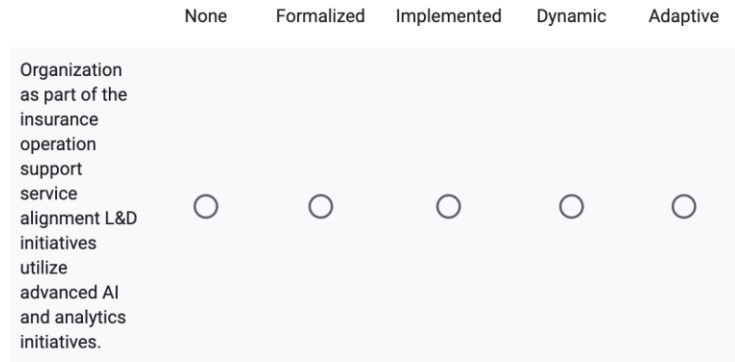
Figure-70: MARAI Platform – Insurance Assessment - Questionnaire 21

CHAPTER VI

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

At the start of the research wish to understand the Implication of AI in Insurance both from insurance industry leader perspective and consumer perspective and found a gap in terms of insurance companies without any standard maturity models in the industry. This lead to the creation of the Novel Maturity assessment model MARAI – Maturity assessment readiness index for AI in Insurance and an initial platform to enable companies to address the assessment requirement for the AI in Insurance.

6.2 Implications

Utilizing MARAI insurance companies can reduce considerable amount of time to understand the maturity level and prioritize the AI usecases to implement based on their maturity level. The novel framework has considerable impact on insurance indsutry and can help reduce drastic effort required by insurance companies for their AI assessment and Investment.

6.3 Recommendations for Future Research

As part of the research outcome MARAI framework is derived focus on the insurance companies assessment results, the same can be expanded and collection of insurance companies can be assessed and a bench mark can be created and the Insurance companies willing to access their readiness can compare the same against the industry piers.

Current research and MARAI framework is generalized the Insurance industry across the board but a specific line of business based industry benchmarking can be included i.e:

Life insurance bench mark, health insurance bench mark etc to enable insurance companies to specifically focus on the sub line of business level maturity.

Current MARAI Framework considered only a specific subset of cost elements and the performance paraments as part of the assessment. The formulae can be further expanded with much wider list of cost element and performance parameters for fine-tuned outcome.

Current MARAI Framework weightage calculation was done based on very smaller group of expert discussion and this can be further refined by expanding the research to understand the weightage distribution to further refine the outcome of the MARAI Framework.

Current MARAI Platform is at very nascent level with only the survey feature built in with basic dashboarding functionality. The usability of the platform can be further enhanced by an insurance industry consortium which can utilize MARAI and perform further fine tune to help them implement AI on their insurance organization.

6.4 Conclusion

The research in the MARAI thesis looks closely at how Artificial Intelligence (AI) is being used in the insurance industry. This study gives valuable insights into how insurance companies are implementing AI, how it affects their operations, where there are gaps, and introduces the MARAI Framework to evaluate AI maturity in insurance operations.

Key Findings:

The use of AI in the insurance industry is varied and complex. Advanced AI technologies aim to improve accuracy, customer engagement, and operational efficiency, significantly changing the industry.

A key gap in the industry is the lack of a standard benchmark to measure how advanced AI implementation is within insurance companies. This gap makes it challenging to align strategies, governance, digital capabilities, automation, and data strategy.

The MARAI Framework is a crucial contribution from this thesis, providing insurance companies with a tool to evaluate their AI maturity. It offers a structured way to identify strategic areas to focus on, tailored to each organization's unique context and timeline.

Implications and Recommendations:

Strategic Planning and AI Integration: Insurance companies need to strategically plan how they will use AI, making sure their AI projects align with their business goals. The MARAI Framework can help organizations assess their AI readiness and find areas that need improvement or development.

Focus on Digital and Technological Capabilities: Insurance companies urgently need to improve their digital and technological infrastructure. This includes upgrading hardware and software and creating a culture that supports digital transformation and continuous learning.

Workforce Development: It's important to address skill gaps and prepare employees for AI-driven operations. Training current staff and attracting new talent skilled in AI and machine learning will be crucial for successfully adopting AI technologies.

Regulatory and Ethical Considerations: As AI technology evolves, regulatory and ethical issues will become more important. Insurance companies must handle these challenges carefully to ensure transparency, fairness, and privacy in their AI applications.

Conclusion:

The thesis thoroughly examines the challenges and opportunities of AI in the insurance industry, leading to the creation of the MARAI Framework. This framework addresses the lack of a benchmark for AI maturity and provides a roadmap for insurance companies to systematically improve their AI capabilities. The research highlights AI's transformative potential in the insurance industry and emphasizes the need for strategic planning, technological investment, workforce development, and ethical considerations for achieving AI maturity. As the industry deals with the complexities of AI adoption, the insights and tools in this thesis offer valuable guidance for gaining a competitive edge and achieving operational excellence in the digital age.

APPENDIX A

SURVEY COVER LETTER

This section details the survey cover letter and research questions used for the research.

Cover Letter for Survey conducted for the Insurance Industry Leaders:

Dear Participant, I invite you to participate in a research survey that aims to gather insights on Impact of using Artificial Intelligence (AI) in Insurance from the perspective of senior business people like yourself. Your participation in this survey is crucial as it will contribute to the understanding of the challenges, skill requirements, and potential benefits associated with impact of AI in Insurance domain.

Survey Details:

·**Purpose**: The purpose of this survey is to examine the use of AI in various insurance company operations, any standard and maturity model followed at companies to prioritize the AI implementation.

·**Participant Criteria**: We are specifically seeking senior business people who are interested in utilizing AI in their Insurance business operations.

·**Survey Length**: The survey will take approximately 5 to 10 minutes to complete.

·**Confidentiality**: Your responses will be kept strictly confidential and will only be used for research purposes. Your anonymity will be maintained throughout the study.

·**What is in it for you**: As a valuable participant I promise to share the research finding, Framework and methodology with complete thesis for your reference once the research is complete.

Your participation in this survey involves answering a series of questions about your organization's current situation, challenges in AI solutions in Insurance operations, and

your perceptions regarding the use of AI techniques in these areas. Please provide your honest opinions and insights based on your experiences.

Survey questions are detailed below.

We highly value your time and expertise, and your input will be instrumental in the success of this research. If you have any questions or concerns regarding the survey, please feel free to contact the researcher, Prasanna Venkatesh Jayaprakash, at prasanna@ssbm.ch (or) prasannavj@gmail.com

Thank you in advance for your participation. Your contribution is greatly appreciated.

Sincerely,

Prasanna Venkatesh Jayaprakash

Cover Letter for the survey conducted from the Insurance product consumers:

Dear participant,

I invite you to participate in a research survey that aims to gather insights on Impact of using Artificial Intelligence (AI) in Insurance from the perspective of insurance product consumers like yourself. Your participation in this survey is crucial as it will contribute to the understanding of the challenges and potential benefits associated.

Survey Details:

·**Purpose**: The purpose of this survey is to examine the use of AI in various insurance product and consumer perspective on Impact of AI in Insurance

·**Participant Criteria**: We are specifically seeking anyone purchased Insurance product to participate on the survey.

·**Survey Length**: The survey will take approximately 5 to 10 minutes to complete.

·**Confidentiality**: Your responses will be kept strictly confidential and will only be used for research purposes. Your anonymity will be maintained throughout the study.

·**What is in it for you**: <u>As a valuable participant I promise to share the research finding, Framework and methodology with complete thesis for your reference once the research is complete.</u>

Your participation in this survey involves answering a series of questions about your insurance purchasing experience and AI Impact. Please provide your honest opinions and insights based on your experiences.

Survey questions are detailed below.

We highly value your time and expertise, and your input will be instrumental in the success of this research. If you have any questions or concerns regarding the survey, please feel free to contact the researcher, Prasanna Venkatesh Jayaprakash, at prasanna@ssbm.ch (or) prasannavj@gmail.com

Thank you in advance for your participation. Your contribution is greatly appreciated.

Sincerely,

Prasanna Venkatesh Jayaprakash

SURVEY QUESTIONAIRE

Below detailing the list of survey questionnaire focused on Insurance industry leaders:

1. What area of Insurance products your company offers - user can choose one or more choose and following are chooses user can choose from Life, Property & Casualty, Auto, Health and Others

2. Which country your insurance company address and requests the users to enter the country name.

3. Which area of your company is utilizing the AI where user can choose from following answers - Product and distribution, Underwriting, Policy Servicing, Claim processing, Fund management and Others

4. Does your company has a AI Strategy in place for which user has an option to chose Yes we do ,No we do not , Not applicable

5. If the user choose the answer as Yes for the above question the following questions will be displayed -

6. Does your company access their AI Maturity compared to the Insurance Industry? Answer options are Yes - we access the maturity , No we do not access the maturity and Not applicable.

7. Does your company offers insurance product enabled with AI? Answer choices including Yes - Already offering, Yes - Planning to offer, No - Not right now

8. Specific to Regulatory challenges In what ways have regulations directly impacted your plans or strategies for AI deployment? Answer choices including Impacted very High, Impacted moderately, Not Impacted, Not considered regulatory details

9. Data Quality and Availability specific question on Does your company ensure the quality and integrity of data used in your AI systems? Answer choices including Yes Fully Agree, Yes Partially Agree and No

10. Technical and Infrastructural Limitations question specific to Does your company current infrastructure support the adoption of AI technologies? Answer choices including Yes Fully Agree, Yes Partially Agree, No they do not support.

11. Cost Implications specific question including Has your company factored AI adoption into your company's long-term financial planning and strategy?

    a. Answer choice including Yes Fully Agree, Yes Partially Agree and No they do not support.

12. Skill Gaps and Workforce Readiness questions including - Is there a strategy in place at your company to bridge the skill gaps? Are you focusing on training existing staff or hiring new talent? Answer choices including focusing on training existing staff

    a. Focusing on hiring new talent , Both choices and None of the above.

13. Customer Acceptance and Trust specific question on Does your company have any strategy around ensure transparency in AI-driven decisions to build trust among customers? Answer choices including Yes we do fully agree, Yes but we are evolving, No we wish to have and No not considering now.

14. Impact on Insurance Products and Services specific question on Are there new types of insurance products that have been made possible or significantly enhanced by AI?

15. Answer choices including Yes we do fully agree, Yes but we are evolving, No we wish to have and No not considering now.

16. Scalability and Integration Issues including Does your company faced any scalability and integration issues as part of integrating the AI on your existing product / department? Answer choices including Yes we faced significant issues, Yes we faced moderate issues, No we did not face any issues and Not Applicable

17. Maturity Model standard specific question including Does your company follow any standard Industry maturity model to identify and address AI enablement in Insurance product or services? Answer choices including Yes we do use maturity model to identify and implement AI, No we do not use any maturity model and Not Sure.

Below detailing the list of survey questionnaire focused on consumers of Specific to person answering the question

1. What is your age group? Answer choices are 18-25, 26-35, 36-45 And >45

2. Specific to the gender What is your gender? Male, Female And Not Willing t specify. Followed by country from where the person purchases insurance.

3. Specific Trust in AI Recommendations - How much trust do you place in insurance product recommendations made by AI systems? Answer choices including I Highly

Trust the AI recommendation, I rarely trust the AI recommendations, Do Not Trust at all and Not Applicable

4. Have you every purchasing insurance product recommended online by providing your information (i.e: income, age group, risk profile etc)? answer choice including Yes, No, Not sure

5. Specific to Comparison with Traditional Methods - Do you prefer AI recommendations over traditional methods of manual insurance purchase? Why or why not? Answer choices including I prefer to use AI recommended, I do not prefer AI recommended product I will choose manual purchase and I don't know.

6. Decision-Making Influences including To what extent do AI recommendations influence your decision to purchase a particular insurance product?

7. Answer choices including Very High Influence, Moderate Influence, No influence

8. And Not Applicable

9. Personalization of Recommendations specific to this do you feel that AI provides more personalized insurance product recommendations compared to other methods? Answer choices including Yes I agree and No

10. Perceived Accuracy and Relevance - Have you ever encountered any inaccuracies or irrelevant suggestions in AI recommendations?

11. Answer choices including No always AI provided accurate recommendations and Yes some time noticed irrelevant recommendations, Yes always found irrelevant recommendations and Not applicable.

12. Privacy and Data Concerns - Do you have any concerns about the privacy of your data when receiving insurance recommendations from AI? Yes I am concerned about my data privacy and No I do not concern about the data privacy

13. Overall Satisfaction with AI Recommendations- How satisfied are you with the insurance products recommended by AI? Answer choices including Highly satisfied, Moderately satisfied, Dissatisfied and Not sure

14. Impact of AI on Purchase Experience - How does the use of AI affect your overall experience of purchasing insurance products? Answer choices including Very positive, Moderately , Negatively and Not sure

15. Willingness to Recommend AI-Based Insurance Products - Would you recommend AI-recommended insurance products to others? Answer choices including, Yes most likely, No I do not wish.