

Embracing industry 5.0 in the insurance sector: A human-centric approach to digital transformation and risk management

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ABSTRACT

Industry 5.0 centers on expansion and partnership between humans and machines working together. The idea mitigates venture risk, elevates consumer support, and optimizes performance using intelligence-based know-how like AI and ML. The human-centric industry is digitizing as Industry 5.0. Therefore, Industry 5.0 is the future of insurance. The imperative to build stakeholder trust will be further cemented for insurers who have adopted ESG, digital, and workforce agility. This study examined bivariate relationships in Structural Equation Modeling based on survey data. It illustrates how innovation, sustainability, human recharge, and AI together support achieving strategic ambitions and results. This research adds to financial services literature by examining antecedents of risk management effectiveness, strategic performance, and competitive advantage based on environmental engagement, human capital flexibility, innovation, and digital contingency readiness in insurance.

Keywords:

Competitive Excellence, Digital Transformation Readiness, Environmental Engagement, Human Capital Agility and Innovation, Industry 5.0,

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1. INTRODUCTION

Technological advancements have disrupted insurance, changed customer expectations and heightened competition. In this context, Industry 5.0 emerged as a paradigm for digital transformation. Industry 5.0 emphasizes human intelligence and modern technology, chiefly artificial intelligence, ensures collaborative, human-centric innovation. In contrast, Industry 4.0 emphasizes automation and the Internet of Things (IoT) (Ghobakhloo et al., 2024). This paradigm offers the insurance industry a distinctive opportunity to leverage AI without sacrificing human touch which is essential for risk assessment, client relations, and overall profitability (Acosta-Prado et al., 2024). The main focus of Industry 5.0 is human-robot collaboration. Modern technology and AI enhance human abilities, enabling more efficient allocation of resources. The insurance industry must understand consumer expectations and assess risks to provide tailor-made solutions. These solutions require experience, empathy, and discernment, which are qualities that cannot be automated. This sector benefits significantly from human-centered digital transformation. Owing to AI, data analytics, and machine learning advancements, insurance companies streamline repetitive operations, optimize decision-making, and provide personalized solutions. However, these technologies should supplement and not replace human knowledge (Mahalakshmi et al., 2022).

Industry 5.0 is being adopted, especially by insurance enterprises. Thus, there is not a small amount of readiness for digital transformation. Digital Transformation Readiness (DTR) assesses an organization's readiness to embrace new technology. Insurance companies need this readiness to improve their operational efficiency, service levels, and risk management (Eling et al., 2022). DTR for a corporation includes technological integration, staff competencies, and organizational structure. To become digitally ready, insurance companies should leverage innovative technology and train their employees to effectively use it. Organizations deploying digital platforms and technology are educating and enabling their people to prioritize technology while maintaining a human-centric service approach. Alignment between DTR and Human Capital Agility and Innovation (HCAI) helps insurance organizations achieve digital transformation. The Human Capital Agility and Innovation Index evaluates workforce ability to adapt to technology and innovate. (Alnasser et al., 2024). HCAI enables innovation and resilience as insurance moves to Industry 5.0, helping insurers adapt to market changes and customer demands. Insurance providers can gain competitive advantage by developing innovative processes and a learning culture. Enterprises that harness artificial intelligence and other digital

technologies to a greater extent to drive innovation and improve business performance should consider having a higher DTR. Human digital transformation is key to the proliferation of HCAI (Aure & Cuenca, 2024).

Along with digital transformation readiness, environmental engagement considerably impacts HCAI and digital transformation of the insurance industry. EE is an organization's commitment to sustainability and corporate social regarding ESGs. Green engagement is necessary to enhance human capital agility and innovation in light of the insurance sector's need to offer sustainable insurance goods, reduce ecological impacts, and comply with environmental, social, and governance - ESG norms. Sustainability could prompt people to innovate solutions to address challenges, create new products and services, and improve organization and society. However, as clients are increasingly opting for insurance companies that are moral and ecologically conscious, engaging in green measures can generate trust (Ali & Anjum, 2024). For Industry 5.0, the insurance sector's adoption of human-centric AI is necessary for the next level of competitive advantage. Achieving competitive greatness requires a business to extend beyond its militia by improving its customer value, operational efficacy, and innovation. A competitive advantage in insurance means utilizing new technologies to enhance a client's experience, improve risk mitigation, and speed up business processes (Elgargouh et al., 2024). Human-centric artificial intelligence allows insurance companies to tailor their products to customers' needs, improve their processes, and make data-driven decisions, helping them to perform better. Adopting AI in decision-making, alongside human-AI augmentation, can provide insurance companies with a competitive edge (Volkmar et al., 2022).

The life insurance industry's competitive edge depends on its strategic performance. SP refers to a corporation's capacity to execute its strategy, attain its business objectives, and supply long-term value to its stakeholders. With Industry 5.0- the strategic goal is defined through adequate employment of AI and other digital resources, human capital agility, and market adaptability (Ghobakhloo et al., 2023). There are three defining factors in an organization's strategic performance. Resource Management Effectiveness the success of a given company regarding the planned strategic objectives, can be treated as the RME how effectively the company is handling its human, technological, and financial resources to achieve the planned level of business objectives. Re-orienting strategic output and values with competitive advantages and resource management can help insurance companies mitigate digital age problems and remain competitive in a fast-growing market (Roy et al., 2024). Human-centric artificial intelligence and risk experience are competitive advantages that bolster resource capability and, thus, are needed, such as AI insurance. The insurance industry refers to an insurance company's ability to identify,

mitigate, and manage RME risk. This comprises growing hazard and risk management, precise risk evaluation, efficient claims administration, and fraud detection. Artificial intelligence and other digital technologies can help insurance companies reduce costs by enhancing risk assessments, preventing fraud, and optimizing claims processing. There is no replacement for human expertise in assessing data, making educated decisions, or managing customer expectations (Peters et al., 2024). Artificial intelligence and human agents work hand in hand to help insurance companies achieve precision, efficiency, and satisfaction in risk management. Human capital agility, innovation, competitive excellence, and resource management excellence are influenced by Industry 5.0 along with sustainable practices and employee empowerment. The effectiveness of risk management depends on sustainability. This covers sustainable insurance products and individuals who meet the ESG criteria. Hence, sustainability can help insurance businesses manage risk, create customer trust, and stand out. Insurers promote innovation and performance by providing access to technology, training, and flexible work hours. They can leverage Industry 5.0, which centers on human-focused digital transformation. Insurance companies must integrate technology and human experience to foster creativity while maintaining ethical business practices. This study examines Industry 5.0's impact on insurance, including its competitive advantages, environmental awareness, human-AI relationships, digital conversion, and resource management. Success requires an organization that values staff input, embraces innovation, and prioritizes shareholder value, risk management, efficiency and customer satisfaction. (Zollo et al., 2016).

This study explores how Digital Transformation Readiness (DTR), Human Capital Agility and Innovation (HCAI), and environmental. It also discusses the investigative issues of how people-driven digital transformation can boost economic strength and perseverance in the insurance sector. Employee engagement (EE) influences Competitive Excellence (CE), Strategic Performance (SP), and Risk Management Effectiveness (RME).

2. LITERATURE REVIEW

2.1 DTR and Human Capital Agility and Innovation - HCAI

DTR Empowers HCAI - HCAI of DTR -Now, Moving Forward in a Digital-Bursting World. Leveraging digital technologies leads to human capital development, making members more adaptable, learning, and innovative. (Ahsan, 2024). This has become crucial for organizational agility and is enabled by technologies like AI, IoT, and blockchain that help make data-driven decisions and foster innovation. This alignment between technological developments and individual capital leads to ongoing innovation, which drives increased organizational agility (Homayoun et al., 2024).

2.2 Leadership, Culture, and Workforce Agility

An organization versed in digital transformation requires the right leadership and culture, as smooth transition to new technologies enhances employee performance and creativity. Digital initiatives rely on 'workforce agility' that interconnects with digital transformation readiness. Organizations should adapt by understanding workforce readiness and attitude to navigate technological changes and succeed with Digital Transformation strategies. DTR plays an important role in enhancing HCAI. However, organizations must tackle resistance to change and skill gaps to tap into digital transformation's potential and build a resilient, adaptable business model (Cheng et al., 2024).

H1 - Digital Transformation Readiness - DTR has a positive effect on Human Capital Agility and Innovation - HCAI.

2.3 Environmental Engagement - EE and Human Capital Agility and Innovation - HCAI

The Organizational Divided – regarding EE, an important dimension of HCAI and organizational sustainability, is a crucial challenge for strategists to satisfy opposing society and environmental demands (Holzinger et al., 2022). Work Engagement, where employees follow and get involved in sustainability, driven enough to act upon the organization and align them in the idea of an eco-oriented Artifex-major cause only to make the output impactful on efficiency and productivity, especially having them part of sustainable events or projects. Businesses that adopt environmental sustainability into their operating models typically undertake transformational processes that promote innovation by exploring novel business models that can respond to changing environmental conditions. Environmental or employee-oriented and sustainability-oriented social responsibility promote innovation by improving R&D efforts and making an organization more appealing to talent, further promoting incremental and radical innovation (Rodríguez Albor et al., 2020).

2.4 Green Human Resource Management and Business Performance

Green Human Resource Management - GHRM practices - A pathway to green innovation as a driver of sustainable development goals. The environmental performance of organizations that focus on green innovation through improved production techniques and product design improves significantly. In sectors such as hospitality, green human capital directly influences innovation activity that subsequently enhances businesses' performance and provides a sustainable competitive advantage. However, challenges like resource constraints, lack of awareness, and resistance to change denote the need for strategic planning to adopt sustainable practices (Kineber et al., 2022).

H2 - Environmental Engagement - EE has a positive effect on Human Capital Agility and Innovation - HCAI.

2.5 Human Capital Agility and Innovation - HCAI and Competitive Excellence - CE

HCAI is one of the key contributors to Competitive Excellence, which drives organizations' ability to adapt and flourish in rapidly changing business environments (Ozmen Garibay et al., 2023). Dynamic capabilities, or the ability of a firm to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments, are important to cultivate both innovation and competitive advantage. In this, human capital is paramount because it creates innovative solutions and solutions at the forefront. Furthermore, human capital enhances the potential to be intrapreneurs, which refers to engaging workers in enhancing job characteristics as an innovative practice to enhance the firm's competitive advantage, which is promoted by digitalization and supply-chain competitiveness (Li et al., 2025).

2.6 Strategic Talent Management and HR Agility

Significantly enhance organizational competitiveness through talent management (detection and development of the workforce), agile teams (designing teams for agile management), and agile management culture (development of agile culture in the organization). These ecosystems empower enterprises to respond quickly to changes in the market, thus staying ahead of the competition (Sun et al., 2024). HR flexibility and agility towards business goals are also crucial to the company's success; creativity, quality performance, and adaptability are necessary to stay ahead of competitors. However, the need for an organization-hardened, industry-specific, contextual approach to HCAI on CE should be considered (Sitty, 2024).

H3 - Human Capital Agility and Innovation - HCAI has a positive effect on Competitive Excellence (CE).

2.7 Strategic Performance - SP and Competitive Excellence - CE

Global Competitiveness Enhancement through SP is an important contributor to CE, as it aligns the organization towards the strategic direction, thus enhancing the competitive position of an organization. Effective SP requires setting clear goals and establishing performance indicators that direct resources to the most relevant aspects of this goal, as these aspects are crucial to achieving competitive excellence through differentiation and value creation. Differentiation through SP will allow organizations to obtain a competitive advantage by creating flagship products, enhancing customer loyalty, and maintaining a long-lasting, sustainable position in the marketplace. Moreover, devising operational and strategic excellence helps firms improve their adaptability and responsiveness in times of market disruptions, which further cements competitive advantage (Wang & Ali, 2023).

2.8 Enhancing Competitiveness through Strategic Management

Customizing SP frameworks with digital solutions ensures business processes align with market conditions, enhancing competitiveness. (Pal, 2025). In competitive settings, barriers arise from superior methods to achieve strategic objectives, where effective leadership and cross-functional collaboration drive opportunities for competitive excellence as organizational core competence, aligned with strategic goals that may vary with organizational capabilities. (Diaz et al., 2022). While SP positively impacts CE, implementation faces challenges from change resistance and resource issues. Regular assessment and adjustment of approaches is crucial for sustained competitive success.

H4 - Strategic Performance - SP has a positive effect on Competitive Excellence - CE.

2.9 Competitive Excellence and Resource Management Excellence

CE and RME are crucial capabilities for performance improvement, and their link is vital. CE pertains to an organization's ability to outperform others using superior strategy and resource deployment. RME emphasizes

optimal use and management of resources to achieve organizational objectives. Literature shows a strong positive relationship between the two, indicating organizations with good resource management also deliver on competitive strategies. (Fainshmidt et al., 2019). CE provides opportunity for improved competitiveness, leading to better resource management practices and optimal utilization. Efficiency in strategic and operational management aligns daily operations with long-term objectives, promoting enhancement and reactivity — factors critical for resource management optimization. Maintaining mechanisms of competence is needed to defend resources with competitive excellence, whereby organizations can execute their unique resources effectively to remain competitive. (Hunziker, 2021).

2.10 Strategic Intent and Resource Allocation

Strategic intent, a main driver of CE, can effectively maintain RME by assisting organizations with resource allocation and competency cultivation (Pilotti et al., 2023). With clear strategic intent, organizations can improve resource management to create overrides that assist in strategic execution and competitiveness. While literature asserts a positive correlation between CE and RME, the business environment remains dynamic. Market volatility and technological innovation may affect this relationship (Mo, 2022). Hence, it must be continuously adapted in competitive strategies and resource management practices.

H5 - Competitive Excellence has a positive effect on Resource Management Excellence.

2.11 Strategic Performance - SP and Resource Management Excellence

Enhancing Resource Management Excellence through Strategic Performance enhances organizational capacity through strategic output (Gupta et al., 2020). Strategic performance management systems, including governance of targets and performance reviews, ensure resources are deployed to realize priorities. When aligned between strategic objectives and resource management practices, organizations yield excellence in resource management by optimizing resource usage to deliver outcomes through goods and services that add value to stakeholder relationships. (Gupta & Arora, 2024). Resource management excellence links strategic management practices (e.g. planning, control), like strategic control, and organizational performance - they have a high correlation ($r = 0.806$).

2.12 Strategic Resource Deployment and HR Integration

Resource deployment capabilities are vital for utilizing them across markets in firms following internationalization strategies (Zahoor et al., 2020). (Zahoor et al., 2020). The ability to manage R&D investment and redeploy strategic resources are key enablers for resource management excellence, particularly for emerging-market firms. SHRM involves aligning human resource policies with the organization's strategic objectives, ensuring strategic management of human capital to enhance performance. Innovation and acting fast in agile environments are additional factors underpinning excellence in resource management (Nayernia et al., 2022). SP closely relates to RME (theory), but effectiveness may moderate based on context (e.g., type of industry, market conditions, organization culture), highlighting the need to customize strategies for optimum outcomes.

H6 - Strategic Performance - SP has a positive effect on Resource Management Excellence

The Moderating Role of Environmental Engagement - EE in the Relationship Between Human Capital Agility and Innovation - HCAI and Competitive Excellence

EE significantly strengthens the relationship between HCAI and CE. EE integrates green human resource management and environmental innovation into practice by mobilizing human capital to enhance agility and innovation, resulting in competitive excellence (Qasim et al., 2024). For example, GHRM practices such as environmentally friendly hiring and training help create a comfortable and green workplace environment, leading to better agility and performance. Agility and innovation are vital for adapting to environmental management practices while improving competitive advantages in industries such as hospitality (Hussain & Malik, 2022).

2.13 Environmental Innovation and Competitive Excellence

Environmental Innovation Acts as A Critical Mediator Between Environmental Responsibility and Competitive Advantage Eco-innovating companies use employee capital dexterity and leadership for competitive advantages. The innovation can be in multiple forms, including green innovation, where green leaders and human capital have been found to moderate the relationship between agility and innovation (Bouguerra et al., 2024). Specifically in the manufacturing sector, green HR practices indirectly influence CE by promoting environmental innovation, highlighting the moderating role of EE. Nevertheless, difficulties persist,

and some environmental approaches, like green dynamic capabilities, are unlikely to bolster creativity universally across contexts. Such evidence reflects the need for targeted environmental engagement strategies to maximize the benefits for HCAI and CE and align with specific organizational needs and capacities (Fu & Weng, 2024).

H7 - Environmental Engagement - EE has a moderating effect on Human Capital Agility and Innovation - HCAI and Competitive Excellence.

Despite a plethora of research on Insurance Industry 5.0, key gaps remain unaddressed. While DTR, HCAI, and EE are vital, the profound role of human-centric AI in innovation and personalized consumer experiences is often overlooked. The interplay between sustainability, ESG principles, and competitive advantage remains underexplored, as does the synergy between DTR and HCAI in fostering adaptability (Kateb & Alahdal, 2024). The moderating influence of EE on HCAI and competitive excellence, particularly in linking innovation and sustainability, is largely uncharted. No author has yet touched the topic of a human-centric model integrating DTR, HCAI, and EE to drive transformation and excellence.

2.14 Research Gap

While prior research has widely explored digital transformation and Industry 4.0 in financial services, few studies have examined the implications of Industry 5.0 for the insurance sector. In particular, the integration of human-centric AI, digital transformation readiness, and workforce agility with strategic performance and risk management remains underexplored. This study addresses this gap by empirically testing how these constructs interact to shape competitiveness and sustainability in insurance.

3. RESEARCH METHODOLOGY

The study is based on a sample of 643 respondents drawn from a total population of 700 investment professionals and individuals. Primary data were collected using a structured questionnaire designed to capture perceptions of DTR, HCAI, EE, CE, SP, and RME. The survey was administered in India, ensuring responses were contextually relevant to the insurance and financial services sector.

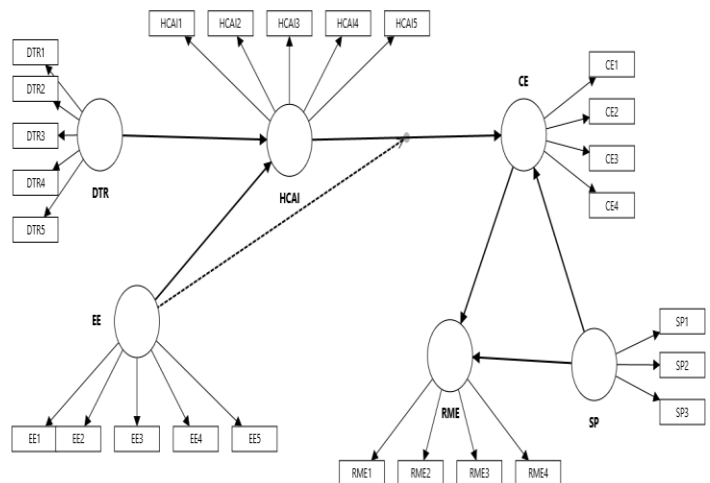


Figure 1. Conceptual Framework of Relationships Among Organizational Factors and Service Performance

As shown in Figure 1, a conceptual framework summarizes the intricate interrelationships among the key organizational constructs involved and their collective impact on strategic performance - SP. These latent constructs are operationalized by specific observable indicators and hypothesized causal pathways between constructs explain their interconnections. Five indicators - DTR1-DTR5 - represent Direct Trust-Related Factors - DTR, which are hypothesized to have a positive effect on the Human Capital Attribute Index - HCAI, which is constructed out of the critical attributes of human capital. Environmental Engagement - EE, also via five indicators - EE1-EE5, is suggested to have an exploratory or tentative relationship with HCAI. As a process-level construct, HCAI mediates CE and RME. CE, which consists of four indicators, positively impacts SP, while RME, which also consists of four indicators, positively impacts SP by efficiently using resources. Finally, SP, the level of outcome dimension for the framework, is scored using three indicators to highlight organizational performance in service delivery.

The choice-based constructs progress logically from input-level - DTR and EE - to process-oriented constructs - HCAI, CE, and RME,

concluding with output-level constructs - SP. Filled arrows in the framework represent strong hypothesized causal relationships, such as the impact of DTR on HCAI and subsequent effects of HCAI on CE, RME, and SP. Finally, the weaker exploratory nature of the relationship between EE and HCAI is represented by a dashed arrow, indicating an area that may warrant further research. This systematic flow represents the organization's transformative journey where initial trust and Environmental Engagement lead to enriched human capital attributes that translate into enhanced customer experience and higher resource management effectiveness, eventually becoming a source of excellent service performance.

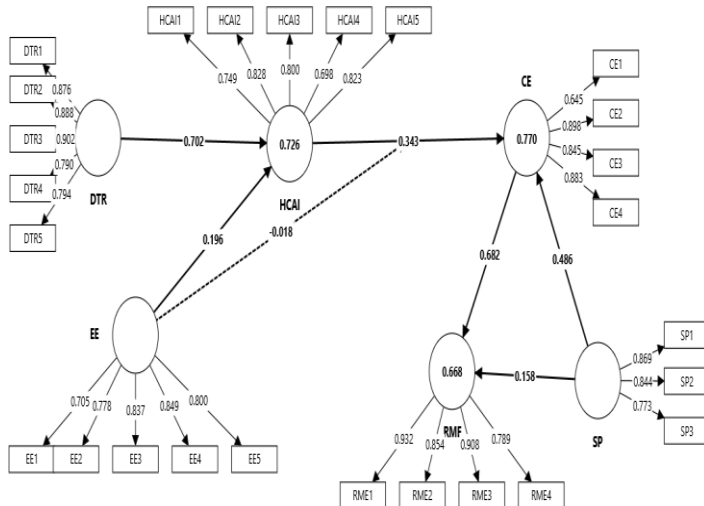


Figure 2. Structural Model with Path Coefficients for Organizational and Performance Constructs

As exhibited in Figure 2, a complex structural equation model - SEM shows the relationship between latent constructs and their observed indicators, as well as proposed causal relationships among them. The path coefficients, indicator loadings, and constructed reliability metrics are used to assess interdependencies' strength, direction, and statistical significance among these latent variables. Operationalization of Latent Constructs. The latent constructs are operationalized by the respective indicators Direct Trust Related Factors - DTR, Environmental Engagement - EE, Human Capital Attribute Index - HCAI, CE, RME, SP. For example, DTR shows good indicator loadings (DTR3 = 0.902), and SP shows good reliability (SP1 = 0.869). The path coefficients show significant relationships, with DTR having a large positive effect on HCAI (0.702). On the other hand, relationships like HCAI → RMF (+0.018) are insignificant, highlighting that not all relationships are equally important in the model. Construct reliability values, which are moderate to high, provide additional evidence of the stability of the model's measurement structure.

The SEM distinguishes direct and indirect associations, highlighting a crucial role for HCAI being a strong propellant to CE (0.343) and a contributor to SP through the mediating relationship HCAI → CE → SP. CE is a pivotal influence on SP, possessing a path coefficient of 0.486, underscoring its role in maximizing service performance results. In contrast, RMF and EE fulfill secondary roles, showing weaker primary contributions (path coefficient of RMF (0.158) or exploratory underpinnings) or impact on HCAI for EE (0.196). Specifically, this model integrates trust-related factors, Environmental Engagement, and resource management into a statistically validated framework that demonstrates their influence on customer experience and service performance.

Table 1. Path Coefficients for Structural Model Relationships

	Path coefficients
CE → RME	0.682
DTR → HCAI	0.702
EE → CE	0.147
EE → HCAI	0.196
HCAI → CE	0.343
SP → CE	0.486
SP → RME	0.158
EE × HCAI → CE	-0.018

As displayed, Table 1 presents comprehensive details on the path coefficients gained from a SEM, elucidating the strength of the constructs' association route under the conceptual framework's significant relations. The at-scale effects, standardized between -1 and 1, reveal the direction and magnitude of the effects, whereby positive values indicate direct positive associations and negative values indicate inverse associations. CE demonstrates a strong positive effect on RME with a path coefficient of 0.682. Concurrently, Direct Trust-Related Factors - DTR assume an important role in the definition of the Human Capital Attribute Index - HCAI with a high coefficient of 0.702. Conversely, the relationship between EE and HCAI has a marginal negative influence on CE (-0.018), demonstrating the parts of the model with minimal influence. The rest of the table emphasizes moderate positive relationships, as in the case of HCAI → CE (0.343) and EE → HCAI (0.196), indicating the necessity of Environmental Engagement and human capital features to promote customer experience. On the other hand, SP enhances CE significantly (coefficient - 0.486), while its impact on RME remains relatively weaker (0.158), indicating a more indirect and subtle correlation. The results placed trust - DTR and CE as strategic variables that can drive organizational performance since they appear vital in enhancing service output and efficiency in resource utilization. Conversely, weak paths, such as the low shooting score of EE relative to the effect on CE, provide space to dig deeper and refine the theoretical framework.

Table 2. R-Square and Adjusted R-Square Values for Latent Constructs

	R-square	R-square adjusted
CE	0.77	0.768
HCAI	0.726	0.725
RME	0.668	0.667

Table - 2 shows R-Square (R^2) and Adjusted R-Square for the key latent constructs in the structural model. The R^2 values indicate the percentage of explained variance due to the independent variables in the dependent constructs, where higher values imply a substantial prediction capability of the predictors. Adjusted R^2 corrects this metric to give greater weight to models with fewer predictors. It penalizes it when additional predictors contribute little to the model, providing a better assessment, especially if multiple predictors occur. In other words, CE has an $R^2 = 0.770$, which implies that 77% of CE variance is explained by its predictors, the Human Capital Attribute Index - HCAI and Environmental Engagement - EE. Similarly, Human Capital Attributes - HCAI generate an R^2 of 0.726 and an Adjusted R^2 of 0.725, confirming the model's precision in elucidating the variance without incorporating unnecessary predictors. The RME shows an $R^2=0.668$, which proves its variance is mostly taken by the predictors, CE and SP, and a small difference between R^2 e Adjusted R^2 .

These results highlight the predictive robustness of the model, where the construct of Customer Experience presented the greatest explanatory power. An insignificant difference between R^2 and Adjusted R^2 for each construct indicates a well-specified model as it shows that the predictors are relevant and explain the variance in the dependent constructs meaningfully. The findings support the notion that Customer Experience, Human Capital Attributes, and Resource Management Effectiveness are significantly influenced by those antecedent constructs, justifying that this model can capture and reflect the relationships and explain them.

Table 3. Reliability and Validity Metrics for Latent Constructs

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CE	0.837	0.858	0.893	0.679
DTR	0.904	0.912	0.929	0.725
EE	0.854	0.858	0.896	0.633
HCAI	0.84	0.846	0.886	0.611
RME	0.894	0.894	0.927	0.762
SP	0.773	0.786	0.868	0.688

Table - 3 includes critical values for assessing the reliability and convergent validity of the model's latent constructs, thereby corroborating that the constructs and their respective indicators are consistent and represent the relevant variables. Cronbach's Alpha is a measure of internal consistency, where values greater than 0.7 are considered acceptable, values greater than 0.8 are considered good, and values larger than 0.9 are deemed excellent. Direct Trust-Related Factors - DTR have an outstanding

reliability score (0.904), while Resource Management Effectiveness (RME) is also striking (0.894), and strategic performance is acceptable at 0.773. Composite Reliability (rho_a and rho_c) measures the construct's overall reliability, as values exceeding 0.8, indicating strong reliability, have been obtained for each construct within the model. In addition, Average Variance Extracted (AVE) assesses convergent validity, where values greater than 0.5 indicate that the construct accounts for more variance than error. Fortunately, all constructs exceeded this threshold, where RME obtained the highest AVE value of 0.762, which evidences a solid indicators representation.

Hence, the results of the metrics strongly support the reliability, the invariance, and the validity (convergent and discriminant) of the constructs in the model. Strong internal consistency and convergent validity were confirmed with elevated Cronbach's Alpha, Composite Reliability, and AVE values for constructs such as DTR and RME. Though the values for SP are relatively lower than those for PP, they still lie within an acceptable range, thus validating the measurement model holistically. These results give us confidence in the measurement properties and provide strong evidence that constructs are stable and valid on measures for further rigorous analytical techniques.

Table 4. Reliability and Validity Metrics for Latent Constructs

	CE	DTR	EE	HCAI	RME	SP
CE	0.82					
DTR	0.76	0.85				
EE	0.72	0.71	0.8			
HCAI	0.78	0.84	0.69	0.781		
RME	0.81	0.89	0.67	0.758	0.87	
SP	0.83	0.65	0.7	0.701	0.72	0.83

Table 4 shows a correlation matrix between the key latent constructs in the model, where each entry measures the association between the two constructs. These correlation coefficients, from -1 (perfect negative) to +1 (perfect positive), provide significant information about the strength and directionality of relationships in the model. Values near 1 indicate a strong positive relationship, while values closer to 0 represent weaker or no relationships. To elaborate, CE has a very highly positive correlation to strategic performance (0.825), indicating that there exists a strong interdependence such that an improvement in customer experience is significantly linked to an improvement in service performance. A significant correlation exists between DTR and RME (0.888), showing direct trust factors are crucial for resource management. Environmental Engagement shows moderate correlations with CE (0.718) and HCAI (0.693), impacting customer satisfaction and human capital attributes. HCAI and RME correlation (0.758) indicates human capital's role in resource management effectiveness. The high DTR and HCAI correlation (0.841) confirms trust's importance in learning and human capital formation. The table shows strong positive correlations with some moderate positive correlations that consider the complex relationships between the constructs and their role in the structure of the model.

Slope Analysis

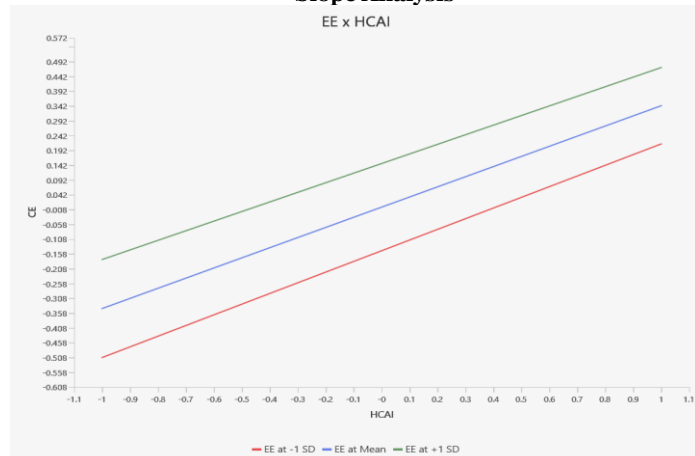


Figure 3. Interaction Effect of Environmental Engagement - EE and Human Capital Attributes Index - HCAI on Customer Experience - CE

Figure -3 presents the moderation of Environmental Engagement - EE about the human capital attributes index - HCAI and CE. EE is used as a moderating variable by investigating how the relationship between HCAI and CE varies depending on different levels of EE in the hypothesized model. HCAI range on the x-axis and the respective predicted values of CE on the y-axis. Distinctions between 3 levels of EE overlap on top of each other, as 3 lines - the red line denotes low EE (1 standard deviation below the mean), the blue line average EE (mean), and finally, the green line high EE (1 standard deviation above the mean). In particular, the green line has the steepest positive slope, indicating that when the EE level is greater, the positive correlation between HCAI and CE is considerably strengthened. On the contrary, the slope of the red line, which represents low EE, is much slower, showing that when employees have less engagement, the effect of HCAI on CE is weak.

This also powerfully highlights that EE acts as a strategic moderator, where higher levels of engagement amplify the positive impact of HCAI on CE while dampening its effect at low levels of engagement. The number underscores organizations' need for strong Environmental Engagement, amplifying human capital attributes' effect on customer experience. It shows how Environmental Engagement links internal capabilities to external performance. Figure 3 shows the moderating effect of Environmental Engagement (EE) on the relationship between HCAI & CE. The curve demonstrates HCAI and CE's relationship as engagement levels change. HCAI on the x-axis and expected amount of CE on the y-axis. Three lines show low engagement (the red line is 1 standard deviation below the mean), the mean (blue line), and high engagement (the green line is 1 standard deviation above the mean). One useful and easily recognizable feature is that the green line has the largest positive slope. This means that higher levels of EE make the relationship between HCAI and CE more robust. On the other hand, the low EE red line does not show an acute slope, suggesting HCAI was relatively less in CE, although low employee engagement types. The graph above clearly shows that EE is a strong moderator that makes the already significant relationship between HCAI and EE positive at high engagement levels and weakens it at lower engagement levels.

3.1 Summary

Supported Hypotheses:

- H1: DTR → HCAI (strong positive effect, $\beta = 0.702$)
- H2: EE → HCAI (positive but weaker, $\beta = 0.196$)
- H3: HCAI → CE (moderate positive effect, $\beta = 0.343$)
- H4: CE → SP (significant positive effect, $\beta = 0.486$)
- H5: CE → RME (strong positive effect, $\beta = 0.682$)

Not Supported / Weak Hypotheses:

- The interaction effect EE × HCAI → CE was insignificant ($\beta = -0.018$).
- The direct path SP → RME was weak ($\beta = 0.158$), suggesting little direct effect.

The results support most of the hypothesized relationships, confirming that DTR, HCAI, and CE play pivotal roles in driving strategic performance and resource management excellence. CE emerged as the strongest mediator, especially in linking HCAI to performance outcomes. However, the moderating effect of EE on HCAI → CE and the direct effect of SP → RME were not supported, indicating these paths are weaker and require further investigation.

4. DISCUSSION

The insurance sector is transforming digitally and operationally due to Industry 5.0. Industry 4.0 emphasizes automation and the Internet of Things, whereas Industry 5.0 prioritizes human innovation and technological proficiency. This advanced methodology impacts the insurance sector, where empathy, discernment, and interpersonal interactions are essential for risk management, customized services, and client confidence. This discourse addresses the fundamental concepts of Industry 5.0, including DTR, HCAI, EE, and competitive superiority and resource administration. Insurance operations, solutions and decision-making processes are being improved by artificial intelligence, machine learning and data analytics. These innovations are most effective when paired with human capabilities. AI can detect fraudulent behavior and predict risk trends; human intelligence contextualizes and personalizes those findings. It points to the conclusion that the adoption of technology should be human-centered and focus on augmenting humans. Industry 5.0 requires the organization level of agility to integrate the emerging technology. This effort requires training, change management, and IT

spending. DTR improves operations and risk handling, giving insurers competitive advantage. Industry 5.0 demands agility in human resources. HCAI represents workforce flexibility and technology. Agility to adapt to market changes and regulations is crucial in insurance. HCAI enables insurers to innovate with market trends.

DTR and HCAI implementation is driven by digital strategies and innovative workforce. Staff need training to leverage AI analytics. Environmental Engagement integrates sustainability in digital transformation. Insurance sector needs sustainable operations and eco-friendly products. ESG principles are integrating into regulations and consumer preferences. Environmental ethics helps insurers attract green clients and meet regulations. To achieve sustainability, organizations have to innovate new products, processes, and business models. Green or renewable energy policies are market-friendly, and therefore more sustainable. This alignment can build trust among stakeholders and customers, and foster competitiveness. A more creative and performant HCAI emerges from this interplay.

The insurance sector is driven by competitive superiority. Achieving this goal needs technological innovation and human intelligence. Insurers leverage human-centric AI to personalize experiences, manage risk, and enable data-driven decision making. These technologies transform the way we operate – whether it be through chatbots powered by AI that resolve customer issues in real-time or predictive analytics, which identify patterns to better anticipate future needs. Competitive and resource management success thrive on strategic performance. SP represents an organization's ability to separate strategic objectives from operational delivery, ensuring efficient resource allocation. Predictive analysis helps insurers deploy resources effectively by predicting high-risk behavior and focusing treatment. RME focuses on leveraging human, financial, and technological resources to drive organizational goals and enhance strategic performance. AI and digital technologies augment fraud detection claims processing and risk assessment. HCAI is reduced and RME increases through employee empowerment and sustainability. Eco-friendly products and ESG requirements provide Insurers savings, trust and differentiation. When employees own innovative solutions, insurers gain creativity and resilience to pivot. Insurance Industry 5.0 is more than technology doctrine - it represents a paradigm leap from historical trends into a humanistic-centric world.

5. CONCLUSION

The future of insurance will rely on new technologies and Industry 5.0. We must track growth and ensure technology serves our morals, environment and humanity. Remco suggested that assessing risks and working with customers is essential in insurance, requiring communication skills and people-friendly attitude. By utilizing human and AI intelligence, insurance companies can enhance their products and services. This makes it easier, isolates suppliers from the market, connects suppliers, and provides information for better choices. Then comes the computer model. Professional development, learning technologies, flexibility - employees must prioritize these. To use parametric or usage-based insurance effectively, teams must survey markets, identify opportunities, and determine how technology offsets risk. Strong HCAIs help companies differentiate themselves and signal competence, affecting the market. To do this well, DTR and HCAI need new weapons, trained people and agility in decisions. For workers to keep pace, Industry 5.0 requires laborers use AI data for training and development. To tame long-term risk, insurers must consider supply and demand-side strategies. ESG issues are becoming important to governments and consumers. Insurance companies can attract eco-conscious workers and generate sustainable ideas. In our culture, love technology that might change the world. Insurers will apply people-centric data and AI to determine insurance prices and premiums. To use them well, we need to consider the people who will be using these technologies.

They were so good at what they did that they took care to use their time and resources wisely. They also positioned themselves far in front of any would-be rivals, which made it more difficult for others to mimic them. Rather, digital technology increases engagement. SP gives you confidence that you are making decisions based on facts, and that gives you excellent confidence from the second you take the stage. This is good for the company, for the technology, and for people. AI can assist insurance companies in expediting claim procedures, detecting fraud, and predicting risks more precisely. It will also delight and free up customers and help the workplace move forward with better motion. At a time of tension, the best treatment for difficult insurance problems is to show some empathy, infections that occur in hospitals, diseases that occur related to devices, and exposures to the environment. In the future, this concept will extend beyond the realm of insurance, enabling scholars to examine how the

principles underlying Industry 5.0 influence business resilience and the various ways in which technology can enhance quality of life.

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