Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 11:2025
DOI: 10.5281/zenodo.17669483

IMPLEMENTATION INDUSTRY 5.0 IN THE INSURANCE SEGMENT - A HUMAN-CENTRIC METHOD TO DIGITAL TRANSFORMATION AND RISK MANAGEMENT

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Abstract

The insurance sector under Industry 5.0 has begun reshaping its focus on live invention, centering on humans and fostering an AI and machine-learning-enabled real-time, data-based environment across various sectors. Industry 4.0 promotes automation; Industry 5.0 which aims to enable a combination of human cognition and digital technology as part of collaborative innovation. The present study examines the disruptive potential associated with Industry 5.0 for the insurance sector regarding Digital Transformation Readiness (DTR), Human Capital agility and Innovation Index (HCAI) and environmental engagement (EE) concepts. For instance, human-centric AI can help insurers understand consumers' holistic needs and wants, customize risk management, and achieve operational efficiencies through understanding-based, contextual decision-making to create products and collaborate experiences to serve them better. DTR and HCAI disclose progress due to the development of the labor force and the requirement of flexibility with people management. EE integrates Sustainability into Digital Transformation with the ESG concept which drives trust and innovation. The composition has a competitive edge by optimizing resources and capitalizing on AI-informed insights, leading to strategic performance excellence and resource management proficiency as enablers. This study introduces Industry 5.0 as an advanced inclusive framework above and beyond technological innovations, which accounts for the ethical, sustainable practices and human-centric quality norms that will empower the insurance industry sector to cope with complexity, accrue resilience and remain sustainable in a stable setting.

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

INTRODUCTION

Technological advancements have disrupted the insurance sector, changed customer expectations and heightened competition. In this fluid paradigm, Industry 5.0 emerged as a new paradigm for digital transformation. Industry 5.0 emphasizes human intelligence and modern technology, chiefly artificial intelligence, ensure 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.

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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. Owning 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 that have embraced a digitalized platform way of working are deploying new and digital platforms along with technology to educate, enable, and help their people put them first when it comes to new technology and making a human-centric approach to service delivery. Alignment between DTR and Human Capital Agility and Innovation (HCAI) is important for insurance organizations to realize digital transformation. The Human Capital agility and Innovation Index assesses whether an organization's workforce can adapt, embrace new technology, and innovate (Alnasser et al., 2024). The HCAI is one of the most essential enablers of innovation and resilience as the insurance industry moves to Industry 5.0. This allows insurers to adapt quickly to market changes, shifts in customer demand, and new threats. Thus, insurance providers can, obtain a competitive advantage and survive in the long run by developing innovative processes and creating 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.

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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 objective. 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), (Khalid, W. et al., 2025), (Khalid, W. E. O. (2020) 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 is depending 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. This in turn promotes creativity and adaptation. By providing flexibility at work, training, development, and cutting-edge technologies, insurance companies create an innovative environment that boosts their performance and presence in a competitive market. Thus, Industry 5.0, based on a human-centric approach to sustainable digital transformation, can be applied in the insurance sector. Digital challenges and opportunities require insurance companies to blend human experience with current technology for innovation and agility with a business strategy aligned with ethical and sustainable tenets.

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This study refers to Industry 5.0's influence on insurance sectors through digital transformation readiness, human-series AI interaction, environmental awareness, competitive advantage, and optimized resource management practices. A dynamic environment in which the effective combination of these elements contributes to stable operational efficiency, risk management, customer satisfaction, innovation, and sustainable long-term stakeholder value (Zollo et al., 2016).

LITERATURE REVIEW

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 a single most significant priority - human capital development, making its members more adaptable, learning, and innovative (Ahsan, 2024). This has become crucial for making the organization agile and is enabled by technologies like AI, IoT, business Intelligence, and blockchain that help make data-driven decisions and foster innovation on the go. This alignment between technological developments and the capital of the individuals within the organization leads to a culture of ongoing innovation, which in turn leads to increased organizational agility (Homayoun et al., 2024), (Khalid, W. E, et al., 2024).

Leadership, Culture, and Workforce Agility

An organization well-versed in digital transformation is accompanied by the right leadership and organizational culture, as the transition to new technologies, when smooth, enhances employee performance and creativity. Digital initiatives significantly rely on 'workforce agility' that is even more interconnected with digital transformation readiness. Organizations should also adapt by understanding the readiness and attitude of the workforce in order to navigate technological changes more effectively and succeed with Digital Transformation strategies. DTR plays a very important role in enhancing HCAI. However, organizations must proactively tackle the challenges of resistance to change and skill gaps to tap into digital transformation's full 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.

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

The Organizational Divided – regarding EE, an important dimension contributing to HCAI, a key feature of organizational sustainability, is a crucial challenge for strategists at all levels to satisfy and respond to 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

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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).

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.

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).

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).

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Recent studies in the Saudi Arabian context emphasize the strategic role of cyber insurance as an enabler in the digital era. Cyber insurance not only addresses the increasing risks of cyberattacks but also strengthens organizational digital transformation readiness (DTR) and supports human capital agility and innovation (HCAI) by equipping employees with the tools and knowledge required to face digital challenges. Furthermore, it contributes to environmental engagement (EE) through sustainable digital risk management practices, thereby enhancing both competitive excellence (CE) and resource management effectiveness (RME). In this sense, cyber insurance becomes a vital component of the industry 5.0 framework by integrating human-centric decision-making, resilience, and sustainability into the insurance sector (Khalid et al., 2025).

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

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

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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).

Enhancing Competitiveness through Strategic Management

Customizing SP frameworks with innovative approaches and digital solutions ensures that business processes align with ever-changing market conditions, leading to significantly enhanced competitiveness (Pal, 2025). In competitive settings, strong barriers can stem from the clear benefits of doing things in a way which is superior to others, especially when the goal is to achieve a strategic objective or take a competitive route, and effective leadership, along with cross-functional collaboration, should be a primary driver that helps in dictating such opportunities to ensure that competitive excellence becomes a part of the core competence of the organization, aligning to achieve the strategic objective which can at times even be dynamic, depending on the capabilities of the organization. The positive effects of SP on CE have been documented extensively; however, implementing these strategies can be challenging due to resistance to change, unalignment of goals and resource allocation issues (Diaz et al., 2022). To maintain competitive success over the long term, it is necessary to assess and adjust approaches regularly.

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

Competitive Excellence and Resource Management Excellence

CE and RME are crucial capabilities for performance improvement, and the link between them is a vital organizational relationship. CE pertains to an organization's ability to achieve better than other organizations using superior strategy and resource deployment.

At the same time, RME emphasizes the optimal use and management of resources to achieve organizational objectives. According to the literature, there is a strong positive relationship between the two, indicating that organizations demonstrating good management of their resources are also those who have been shown to deliver on competitive strategies (Fainshmidt et al., 2019).

Thus, CE might provide the opportunity for improved competitiveness, leading to better resource management practices and optimal resource utilization. Furthermore, efficiency in strategic and operational management, as part of CE, aligns daily operations with long-term objectives, promoting continuous enhancement and reactivity — factors critical for resource management optimization. In addition, maintaining mechanisms of competence is also needed to defend resources with competitive excellence, whereby organizations can execute their one-of-a-kind resources effectively to remain competitive (Hunziker, 2021).

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Strategic Intent and Resource Allocation

As one of the main drivers of CE, strategic intent can also effectively maintain RME by assisting organizations with resource allocation and competency cultivation (Pilotti et al., 2023). With a clear strategic intent, organizations can improve their resource management to create better overrides that assist in strategic execution and aid in competitiveness.

Although literature asserts the positive correlation between CE and RME, it must be acknowledged that the business environment is dynamic. Market volatility and technological innovation may affect this relationship (Mo, 2022). Hence, it must be continuously adapted and innovated in competitive strategies and resource management practices.

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

Strategic Performance - SP and Resource Management Excellence

Enhancing Resource Management Excellence through Strategic Performance enhances organizational capacity through a strategic output proposition (Gupta et al., 2020). Moreover, strategic performance management systems, including explicit governance of individual targets and performance reviews, ensure that resources are deployed to realize strategic priorities.

When aligned between strategic objectives and resource management practices, organizational factions will yield excellence in resource management as they build on optimizing resource usage to deliver desired outcomes through goods and services that add value to stakeholder relationships (Gupta & Arora, 2024). Resource management excellence is a link between strategic management practices (e.g., planning, control), like strategic control, and organizational performance -- they have a high correlation (r = 0.806).

Strategic Resource Deployment and HR Integration

Such resource deployment capabilities are vital for effectively utilizing them across various markets in firms that follow internationalization strategies (Zahoor et al., 2020). The ability to manage R&D investment and redeploy strategic resources are among the key enablers for resource management excellence, especially for emerging-market firms. Moreover, SHRM involves aligning human resource policies and practices with the organization's strategic objectives, thus ensuring the strategic management of its human capital to enhance overall performance.

Innovation and acting fast, especially in agile environments, are additional factors underpinning excellence in resource management (Nayernia et al., 2022). SP closely relates to RME (theory). However, the effectiveness may moderate based on the context (e.g., type of industry, market conditions, organization culture) in which the initiative is undertaken, highlighting the need to customize the strategies for optimum outcomes.

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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).

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.

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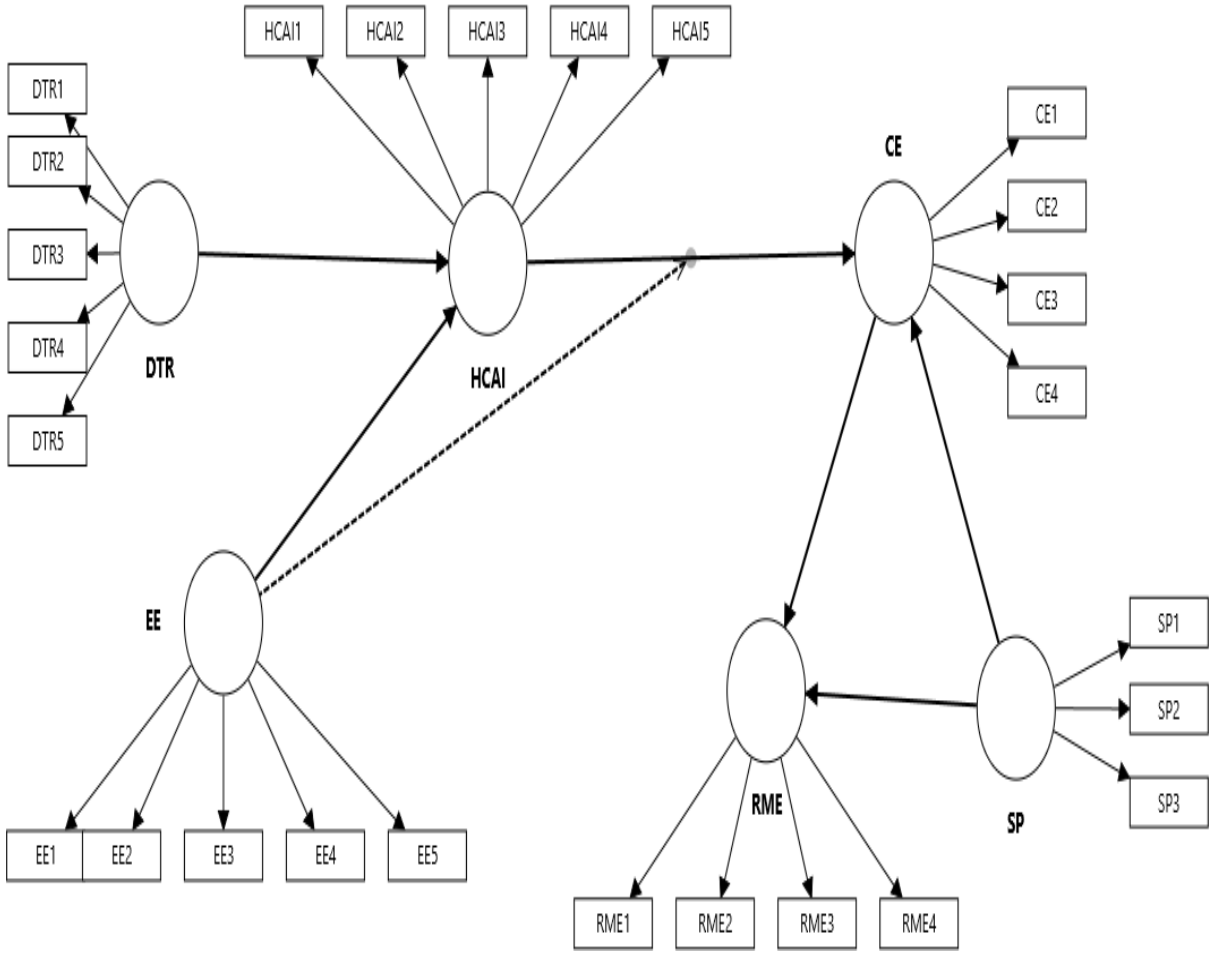

Figure 1: Conceptual Framework of Relationships Among Organizational Factors and Service Performance

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.

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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.

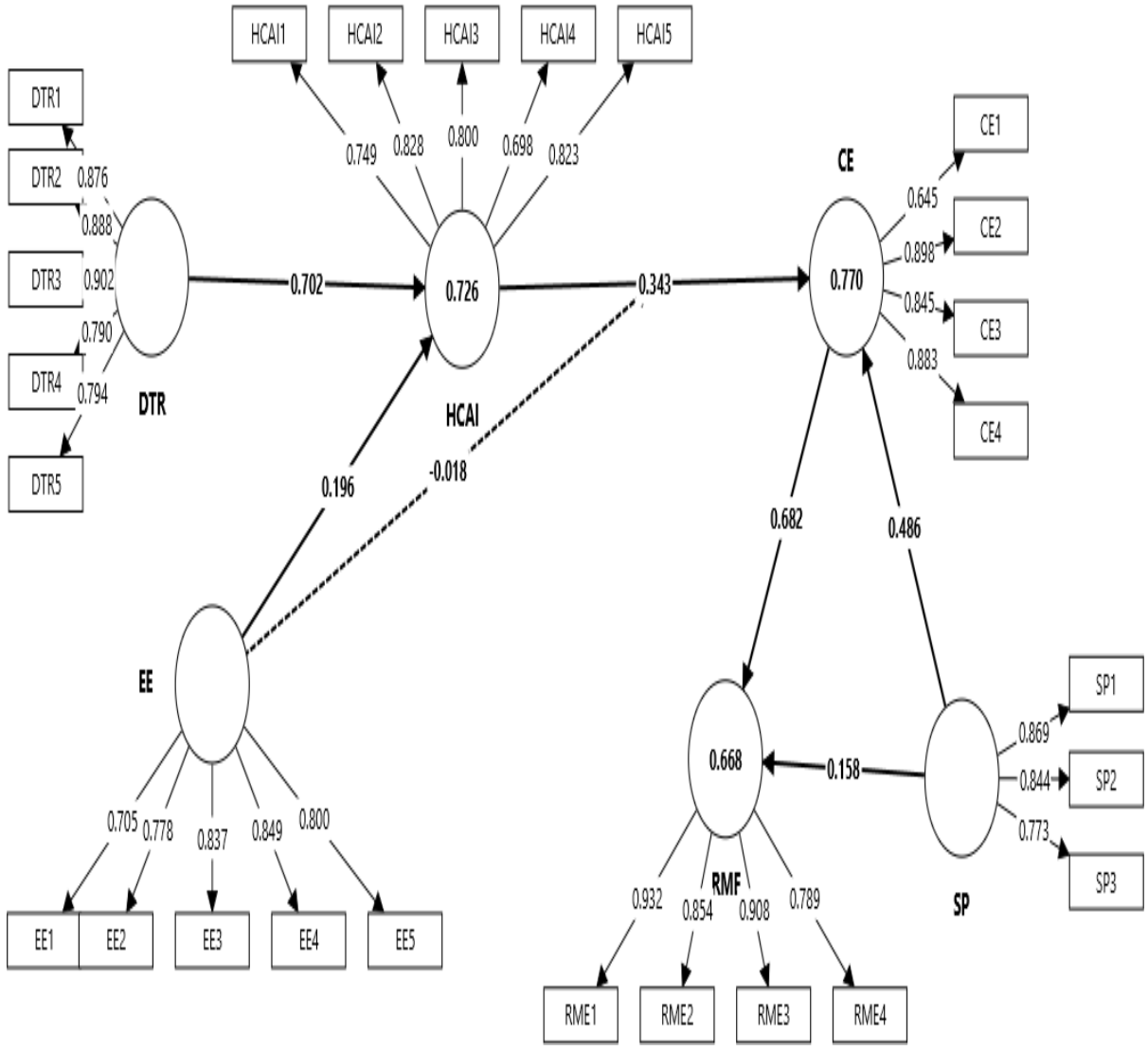

Figure 2: Structural Model with Path Coefficients for Organizational and Performance Constructs

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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 x 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.

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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. 251The 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.

Tianjin Daxue Xuebao (Ziran Kexue yu Gongcheng Jishu Ban)/
Journal of Tianjin University Science and Technology
ISSN (Online):0493-2137
E-Publication: Online Open Access
Vol: 58 Issue: 11:2025
DOI: 10.5281/zenodo.17669483

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

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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. Likewise, we can see a significant correlation between DTR and RME (0.888), demonstrating that direct trust-related factors are crucial in improving resource management. Environmental Engagement - EE indicates moderate correlations with many of the constructs like CE (0.718) and Human Capital Attribute Index - HCAI (0.693), which impact both customer satisfaction and human capital attribute building, respectively.

Also, the table shows a significant relationship between HCAI and RME (0.758), indicating that human capital attributes play a significant role in resource management effectiveness. Finally, the high DTR and HCAI correlation (0.841) confirms the important functionalities of trust in the learning process, just not for critical factors for 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

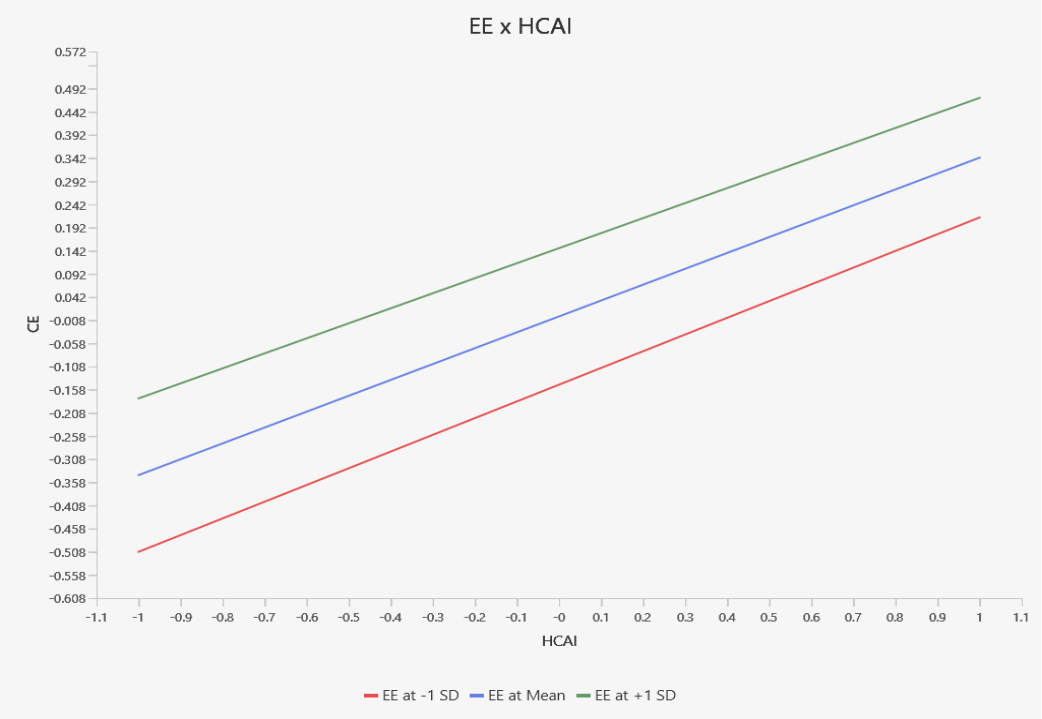

Figure 3: Interaction Effect of Environmental Engagement - EE and Human Capital Attributes Index - HCAI on Customer Experience - CE

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DOI: 10.5281/zenodo.17669483

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 the strategic business need for organizations to have strong Environmental Engagement, amplifying the effect of human capital attributes on the customer experience. It powerfully reiterates the pivotal nature of how Environmental Engagement underpins the bond between internal capabilities and external performance results.)

Figure 3 is an average introduction of the moderator, i.e., Environmental Engagement - EE, on the relationship between dependent and independent variables - HCAI & CE. The curve shows the dynamic relationship between HCAI and CE 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.

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.

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Industry 5.0 is driven by technological innovation, not substitution. It is an added advantage since insurance businesses need to understand complex customer needs and assess complex hazards. 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. DTR is a prerequisite for Transformation. Industry 5.0 requires the organization level of agility to integrate the emerging technology. Insurance DTR leverages employee use of technological advancements.

This effort requires significant training, change management, and strategic IT spending. It is also needed a culture that encourages adaptability and innovation and promoting the use of digital technologies for professional development. DTR improves operations, service delivery, and risk handling, giving insurers an edge over the competition. In Industry 5.0, agility and innovation in human resources are required. HCAI is the flexibility, creativity, and technology of the workforce.

Agility to adapt to market fluctuations, consumer preferences and intricate regulations is the need of the hour, especially in the insurance industry. Who can work with AI-empowered underwriting methods must be workers with technology use and understanding? A useful, parametric insurance firm requires a savvy team that seeks out new opportunities. The advancement of HCAI will allow insurers to innovate and adapt to the changing market trends.

Symbiotic relationship between DTR and HCAI Their implementation is accelerated by innovative digital transformation strategies and a nimble, inventive workforce. This shows the necessity of the technology + humanity combination. Insurers using AI analytics need to train staff on how to interpret and leverage the discoveries. This reflects Industry 5.0 features such as dual investments that improve productivity and foster learning and innovation. Environmental Engagement - EE contributes to this dialogue by integrating sustainability within the digital transformation. While insurance has been one of the less visible sectors as regards sustainability, sustainable operations and eco-friendly insurance products are needed.

ESG principles are becoming more deeply integrated into regulatory frameworks and consumer preferences. Incorporating environmental ethics may help the insurers to increase their reputational capital, attract green values clients, and satisfy progressive regulations. Focus on EE, HCAI, and competitiveness.

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. Which helps create Environmental Engagement by providing people with a reason to positively impact society and the environment. A more creative

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and performant HCAI emerges from this interplay. The insurance sector is driven by competitive superiority. Industry 5.0. 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. It takes the collaboration of humans and AI systems to derive as much value as possible from these technologies. Competitive and resource management success thrive on strategic performance. SP stands for an organization ability to undress strategic objectives from its operational delivery, ensuring efficient resource allocation.

The third industrial revolution brought in the hybridization of the desktop computer and digitization that began to innovate aspects of production, decision-making processes, and customer experiences in Industry 4.0.[8] Industry 5.0 is the deployment of brilliant production that uses digital technology to make these processes and experiences engaging.[9] Predictive analysis helps insurers to deploy resources effectively and minimize losses by predicting high-risk behavior and focusing treatment accordingly. The essence of RME is the focus on effectively leveraging available human, financial, and technological resources to drive the delivery of organizational goals which in turn enhances strategic performance.

AI and digital technologies augment fraud detection, claims processing and risk assessment. They work so well because they reflect human abilities. To achieve the best results, insurers need to train their people to wield their AI technology accurately, quickly, empathetically and in a patient, understanding manner. HCAI is reduced and RME is increased through employee empowerment and sustainability. Environmentally-friendly products and meeting ESG requirements provide Insurer's savings, trust and differentiation. When employees own the solutions that innovate, the creativity and resilience with which insurers generate adds to their ability to pivot. Insurance Industry 5.0, therefore, is more than just a doctrine of technology, it is a paradigm leap from the historical trends into manager in a humanistic-centric world.

CONCLUSION

The insurance sector is evolving with Industry 5.0, which emphasizes human centricity and advanced technology. It is a well-functioning collaboration of intelligent technologies with people that brings about human capabilities, creativity, and the spirit of human-service the traits of Industry 5.0. This change compels us to rethink our approach to digital transformation to unite technology with ethical, environmental, and human values. The focus of Industry 5.0 is on human-robot collaboration rather than replacing human skills. The art of insurance depends on empathy, wisdom, and human connection to address complex risks and forge deep relationships with customers, all of which are inherently collaborative. Combining human expertise with AI-driven technology allow insurers to customize products while improving operational efficiency and increasing

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decision-making and customer relationships. It uses a Digital Transformation Readiness a firm that can accept, adopt, and apply new technology in a rapidly transforming business environment is a winner. They are teaching skills and promote lifelong learning, the basis for creativity, and insurance DTR.

Insurers may gain a competitive edge in optimizing operations, improving services, and developing new risk management strategies. Human Capital Agility and Innovation - Industry 5.0, also requires HCAI—the agility of the workforce to adapt to change, adopt new technologies, and reinvent itself. Picture an entity that is agile enough to respond to market volatility, consumer demand, and complex regulations. Building parametric or usage-based insurance needs a team that can spot market opportunities yet understand the potential risks and how to mitigate them through advanced technology. A strong HCAI cultivates resilience and creativity, ensuring that firms are poised competitively into a leadership role. DTR is complementary to HCAI and vice versa. Their implementation is powered by leading tech agile, and creative staff. This finding indicates the importance of technological and human growth. To maximize the potential of new technological capabilities, AI-augmented analytics must be framed within a continuous learning strategy grounded in human staff training in line with Industry 5.0.

In the insurance sector, sustainable practices and eco-friendly insurance product are as must be considered. These efforts demonstrate the growing importance of ESG as a part of consumer decisions and regulations. This will allow sustainability to drive innovation for insurers, attract environmentally sensitive enterprise customers, and build reputation. The Environmental Engagement influence the workforce, revitalizes healthcare-associated infection initiatives, and drives a virtuous cycle of performance, sustainability, and competitive advantage.

Such an integration of technology and human expertise is essential in this paradigm to gain a competitive edge. Human-centric AIs empowers insurers to tailor products, analyze risks, and make data-driven decisions. Only humans can maximize the potential of such systems using empathy, context understanding, and nuanced decision-making. Through a managed harmonization process, value-added is unlocked, and operational effectiveness is ensured. Strategies have a competitive edge with excellent performance and resource management. The SP leverages digital technologies to improve decision-making and operational efficiency. RME optimization will add to human, financial and technical resources. For insurance companies, artificial intelligence can potentially improve claim processing, fraud detection and risk assessment, yielding higher operational efficiency and consumer happiness.

Once businesses start to focus on Trust, Creativity and Adaptability through Empowering and Sustaining Employees, the insurance sector will start playing a leading role in establishing the new normal of digital transformation, innovating and redefining competitiveness through Industry 5.0.0 for insurers who wish to maintain a human touch while adapting to the use of technology, DTR, HCAI, and EE provide an opportunity for insurers to be future-ready.

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