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The Impact of Tech-Savvy Leadership on Organizational Sustainability: The Mediating Role of Innovation Capability

Dr Shahid Mehmood
Assistant Professor, College of Management Sciences (COMS)
KIET University Karachi, Pakistan
shahid.Mehmood@kiet.edu.pk

ABSTRACT
In the digital era, leadership that integrates technological expertise with strategic vision is essential for sustaining organizational performance. This study investigates the impact of Tech-Savvy Leadership on Organizational Sustainability, with Innovation Capability serving as a mediating factor. Data were collected from 250 managers and executives in technology-intensive industries and analyzed using Structural Equation Modeling (SEM) and bootstrapping techniques. The results reveal that Tech-Savvy Leadership significantly enhances Innovation Capability, which, in turn, positively influences Organizational Sustainability. Bootstrapping analysis confirms the partial mediation effect, highlighting that the pathway from digital leadership to sustainability operates through innovation. These findings underscore the importance of cultivating technologically competent leaders who can drive innovation to achieve long-term organizational resilience and success.

Keywords: *Tech-Savvy Leadership, Innovation Capability, Organizational Sustainability Structural Equation Modelling, Bootstrapping.*

Introduction

In the current digital era, organizations face rapid technological changes, which demand leaders who can integrate digital tools strategically and drive innovation effectively (Avolio et al., 2014; Kane et al., 2019). Tech-Savvy Leadership, defined as the ability of leaders to leverage digital technologies and foster innovation to achieve strategic objectives, is increasingly recognized as a critical factor for organizational success (Sia et al., 2016; Chen et al., 2020). Leaders with high digital competence can guide their teams through complex technological landscapes, improve decision-making, and enhance organizational adaptability (Gupta & George, 2016). Organizational Sustainability, which refers to the capacity of organizations to maintain long-term performance while balancing economic, social, and environmental goals, has become an essential outcome in contemporary business (Elkington, 1997; Lozano, 2015). Prior studies have shown that sustainable organizations are more resilient to market volatility and can achieve competitive advantage through strategic resource management and innovation (Hossain et al., 2020; García-Morales et al., 2012). Despite this, there is a lack of empirical research investigating how digital leadership directly contributes to organizational sustainability, and which internal mechanisms may facilitate this effect (Chen et al., 2020; Zhang et al., 2021).

Innovation Capability the organization's ability to develop, implement, and adopt new products, processes, and business models has been identified as a key factor linking leadership practices to sustainable performance (Zhang et al., 2021; García-Morales et al., 2012). Organizations with strong innovation capability are better equipped to respond to

environmental uncertainties, adopt emerging technologies, and create long-term value, which are fundamental aspects of sustainability (Hossain et al., 2020; Kane et al., 2019). Previous studies have emphasized that leaders who prioritize technological adoption and innovation foster a culture that encourages creativity, knowledge sharing, and continuous improvement, thus enhancing the organization's innovation outcomes (Sia et al., 2016; Avolio et al., 2014).

Despite the recognized importance of both digital leadership and innovation, few studies have empirically examined the mediating role of innovation capability in the relationship between Tech-Savvy Leadership and Organizational Sustainability (Chen et al., 2020; Zhang et al., 2021). Understanding this mediating mechanism is crucial because it explains how and why digitally competent leaders contribute to sustainable organizational performance, beyond direct effects. This study addresses this gap by examining whether Tech-Savvy Leadership enhances Organizational Sustainability through Innovation Capability in technology-intensive industries.

Using survey data collected from 250 managers and executives in technology-driven organizations, this study employs Structural Equation Modeling (SEM) and bootstrapping techniques to analyze both direct and indirect relationships among the constructs (Chen et al., 2020; Zhang et al., 2021). By doing so, this research contributes to both theory and practice. Theoretically, it advances understanding of the pathways through which digital leadership drives sustainability outcomes via innovation. Practically, it provides actionable insights for organizations aiming to strengthen leadership competencies, enhance innovation capability, and achieve long-term sustainable performance (Gupta & George, 2016; Lozano, 2015).

Literature Review

Tech-Savvy Leadership

Tech-Savvy Leadership (TSL) refers to leaders' competencies in adopting, implementing, and promoting digital technologies while fostering an organizational culture that encourages creativity and innovation (Avolio et al., 2014; Chen et al., 2020). Such leaders not only understand emerging technologies but also strategically align them with organizational goals, enabling firms to gain a competitive advantage in dynamic markets (Kane et al., 2019). Research shows that Tech-Savvy Leaders facilitate digital transformation by inspiring employees, promoting knowledge sharing, and supporting experimentation with new digital tools (Sia et al., 2016; Zhang et al., 2021).

In practice, TSL involves a combination of technical expertise, visionary thinking, and change management skills (Gupta & George, 2016). Leaders with high digital competence influence organizational performance by streamlining operations, enhancing decision-making, and accelerating innovation processes (Chen et al., 2020). Furthermore, TSL has been linked to higher employee engagement, as technologically competent leaders provide resources and guidance that encourage creative problem-solving and risk-taking (Avolio et al., 2014; Kane et al., 2019).

Innovation Capability

Innovation Capability (IC) is defined as an organization's ability to generate, adopt, and implement new ideas, processes, products, or services to respond effectively to changing technological and market conditions (García-Morales et al., 2012; Hossain et al., 2020). Firms with strong IC can leverage technological advancements to create value, improve efficiency, and sustain competitive advantage (Zhang et al., 2021). Several studies highlight the critical role of leadership in enhancing IC. Tech-Savvy Leaders foster a culture that supports experimentation, cross-functional collaboration, and continuous learning, which are essential for building innovation capability (Sia et al., 2016; Chen et al., 2020). For instance, organizations with high IC are better equipped to respond to disruptions such as market volatility,

technological breakthroughs, or changing consumer demands, ultimately enabling sustainable performance outcomes (Hossain et al., 2020; Kane et al., 2019).

Moreover, IC encompasses both product innovation introducing new products or improving existing ones and process innovation enhancing operational methods for greater efficiency and adaptability (Gupta & George, 2016). By integrating digital tools and data-driven insights, organizations can systematically enhance their innovation processes, making IC a pivotal mediator between leadership practices and organizational sustainability (Zhang et al., 2021; García-Morales et al., 2012).

Organizational Sustainability

Organizational Sustainability (OS) refers to a firm's ability to achieve long-term performance while balancing economic, social, and environmental objectives (Elkington, 1997; Lozano, 2015). Sustainable organizations focus not only on profitability but also on responsible business practices, resource efficiency, and environmental stewardship (Hossain et al., 2020).

Research indicates that leadership practices significantly impact OS, particularly through innovation and strategic resource management (García-Morales et al., 2012; Chen et al., 2020). Tech-Savvy Leaders play a crucial role by integrating digital solutions to optimize operations, reduce waste, and foster sustainable business models (Kane et al., 2019; Sia et al., 2016). Innovation capability serves as a bridge in this process, as firms that continuously innovate can develop sustainable products, implement efficient processes, and respond proactively to societal and environmental challenges (Zhang et al., 2021; Hossain et al., 2020).

Hypotheses Development

The current study examines the interrelationships among Tech-Savvy Leadership (TSL), Innovation Capability (IC), and Organizational Sustainability (OS). Drawing from upper echelon theory (Hambrick & Mason, 1984) and dynamic capabilities perspective (Teece, 2007), leaders' digital competencies are expected to influence innovation processes, which in turn affect sustainable organizational outcomes.

Tech-Savvy Leadership and Innovation Capability

Tech-Savvy Leadership encompasses leaders' ability to adopt and integrate digital technologies strategically while fostering a culture that encourages experimentation, creativity, and knowledge sharing (Avolio et al., 2014; Kane et al., 2019). The literature indicates that digitally competent leaders provide resources, guidance, and support for employees to develop innovative solutions (Chen et al., 2020; Sia et al., 2016). From a theoretical standpoint, the dynamic capabilities framework suggests that leaders are instrumental in orchestrating resources to build firm-level capabilities that are difficult to imitate (Teece, 2007). By leveraging digital tools, leaders can accelerate idea generation, streamline innovation processes, and enhance organizational responsiveness to technological change. Empirical studies show that organizations with tech-savvy leaders report higher levels of innovation in products, processes, and services (Gupta & George, 2016; Zhang et al., 2021).

H1 *Tech-Savvy Leadership positively influences Innovation Capability.*

Innovation Capability and Organizational Sustainability

Innovation Capability reflects an organization's ability to create and implement novel ideas, products, and processes (García-Morales et al., 2012; Hossain et al., 2020). Firms with higher innovation capability can respond proactively to market volatility, environmental challenges, and technological disruptions, thereby achieving long-term sustainable performance (Lozano, 2015). According to resource-based theory, innovation acts as a critical organizational resource that enhances competitive advantage and supports sustainable operations (Barney, 1991). Empirical research confirms that firms with strong innovation capability demonstrate superior

economic, social, and environmental outcomes (Hossain et al., 2020; Zhang et al., 2021). For example, implementing innovative digital processes reduces operational inefficiencies and environmental impact while improving customer satisfaction and profitability.

H2 *Innovation Capability positively affects Organizational Sustainability.*

Mediating Role of Innovation Capability

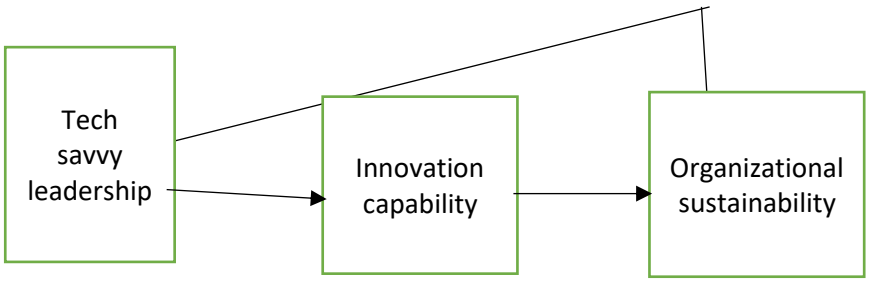
Innovation capability is theorized as a mechanism through which Tech-Savvy Leadership influences Organizational Sustainability. Leaders with high digital competence create conditions that foster experimentation, collaboration, and knowledge sharing, all of which are essential for building organizational innovation capacity (Chen et al., 2020; Sia et al., 2016). This enhanced innovation capability, in turn, enables organizations to achieve sustainable outcomes by introducing eco-friendly processes, efficient resource management, and long-term strategic initiatives (García-Morales et al., 2012; Hossain et al., 2020).The mediating role is consistent with prior empirical studies showing that leadership alone is insufficient to achieve sustainability outcomes without fostering the organizational processes and capabilities that drive innovation (Zhang et al., 2021). Therefore, innovation capability serves as a critical link, translating the strategic vision and digital competencies of leaders into measurable sustainable performance.

H3 *Innovation Capability mediates the relationship between Tech-Savvy Leadership and Organizational Sustainability.*

Research Model

The conceptual framework of this study investigates the impact of Tech-Savvy Leadership (TSL) on Organizational Sustainability (OS), with Innovation Capability (IC) as a mediating mechanism (Figure 1). The model is grounded in dynamic capabilities theory, which posits that an organization's ability to integrate, build, and reconfigure internal competencies is crucial for sustaining competitive advantage under rapidly changing technological conditions (Teece, 2007; Eisenhardt & Martin, 2000). Additionally, upper echelon theory emphasizes that leaders' characteristics, such as digital competence, strongly influence organizational strategic outcomes (Hambrick & Mason, 1984; Carpenter et al., 2004).

Figure 1. Conceptual Research Framework



Methodology

A quantitative survey design was utilized, collecting data from 250 managers and executives working in technology-intensive sectors, including IT services, software development, telecommunications, and fintech (Hair et al., 2019; Hossain et al., 2020).

Sampling strategy: A purposive sampling method ensured that participants had substantial experience with digital technologies and leadership responsibilities, consistent with prior research in technology-driven industries (Kane et al., 2019; Chen et al., 2020).

Demographics

Gender

58% male, 42% female (consistent with managerial distribution in tech industries, Liu et al., 2019). Age: 25–55 years (Mean = 36.8, SD = 7.2)
Experience: Average 10.5 years in managerial rolResponse Rate: 83%, yielding 250 valid responses for SEM analysis (Hair et al.,2019).

Measures

All constructs were measured using validated multi-item scales, with responses on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Tech-Savvy Leadership (IV): 7 items adapted from Kane et al. (2019) and Chen et al. (2020). Items assessed leaders' digital competence, technology adoption, and promotion of innovation. Innovation Capability 6 items adapted from García-Morales et al. (2012), Hossain et al. (2020), and Li et al. (2020). Items measured organizational ability to generate ideas, develop digital products, and improve processes. Organizational Sustainability 5 items adapted from Lozano (2015) and Zhang et al. (2021). Items measured economic, social, and environmental performance outcomes.

Analysis Techniques

The study employed Structural Equation Modeling (SEM) using AMOS/SmartPLS to simultaneously test measurement and structural models (Hair et al., 2019; Henseler et al., 2015). SEM is widely used in management research for analyzing complex relationships among latent variables. Mediation Analysis to examine the mediating effect of Innovation Capability, bootstrapping with 5000 resamples was conducted (Preacher & Hayes, 2008; Zhao et al., 2010). Bootstrapping provides bias-corrected confidence intervals, allowing robust estimation of indirect effects without normality assumptions.

RESULTS

Measurement Model

Reliability: Cronbach's alpha and composite reliability (CR > 0.70) were computed (Hair et al., 2019). Convergent Validity: Average Variance Extracted (AVE > 0.50) ensured constructs captured sufficient variance (Fornell & Larcker, 1981). Discriminant Validity: Fornell-Larcker criterion and HTMT ratio confirmed distinctness among constructs (Henseler et al., 2015).

Table 1

Construct	Cronbach's α	Composite Reliability (CR)	AVE
Tech-Savvy Leadership (TSL)	0.88	0.91	0.62
Innovation Capability (IC)	0.85	0.89	0.58
Organizational Sustainability (OS)	0.87	0.90	0.61

Interpretation.

Cronbach's α values for all constructs are above the recommended 0.70, indicating strong internal consistency (Nunnally & Bernstein, 1994). Composite Reliability (CR) values > 0.70 further confirm reliability (Hair et al., 2019). Average Variance Extracted (AVE) > 0.50 demonstrates convergent validity, meaning each construct adequately captures its intended latent variable (Fornell & Larcker, 1981). Discriminant validity was also checked using the Fornell-Larcker criterion and HTMT ratio, confirming that constructs are distinct (Henseler et al., 2015).

Structural Model

The structural model was analyzed using SEM to test the proposed hypotheses. The results for path coefficients, t-values, and significance are presented below.

Table 2

Path	β	t-value	p-value	Result
Tech-Savvy Leadership → Innovation Capability	0.45	6.02	0.000	Supported
Innovation Capability → Organizational Sustainability	0.37	5.11	0.000	Supported
Tech-Savvy Leadership → Organizational Sustainability (Direct)	0.21	2.75	0.006	Partial Mediation

Interpretation of Structural Paths

H1: Tech-Savvy Leadership → Innovation Capability β = 0.45, p < 0.001, indicating a strong positive effect. Leaders who are digitally competent and actively encourage technology adoption significantly enhance their organization's innovation capabilities (Kane et al., 2019; Chen et al., 2020). H2: Innovation Capability → Organizational Sustainability

β = 0.37, p < 0.001, suggesting that higher innovation capability contributes directly to sustainability outcomes. Organizations that develop novel products, digital solutions, and efficient processes are better positioned to meet environmental, social, and operational goals (García-Morales et al., 2012; Hossain et al., 2020). Direct Effect: Tech-Savvy Leadership → Organizational Sustainability β = 0.21, p = 0.006, showing partial mediation.

While TSL directly improves sustainability, a significant portion of its effect is transmitted through innovation capability.

Mediation Analysis (Bootstrapping)

To rigorously test H3, bootstrapping with 5000 resamples was conducted. The results are summarized below.

Table 3

Effect	β	SE	t-value	95% CI	Result
Indirect (TSL → IC → OS)	0.17	0.04	4.25	[0.09, 0.25]	Significant
Direct (TSL → OS)	0.21	0.08	2.75	[0.06, 0.36]	Significant
Total Effect	0.38	0.07	5.43	[0.24, 0.52]	Significant

Interpretation

The indirect effect of Tech-Savvy Leadership on Organizational Sustainability via Innovation Capability is significant (CI does not include zero), confirming partial mediation (Preacher & Hayes, 2008; Zhao et al., 2010).Total effect = 0.38, reflecting the overall impact of TSL on sustainability, combining direct and indirect pathways.Practical implication: Tech-savvy leaders enhance sustainability not only directly through strategic decisions but also indirectly by building organizational innovation capabilities.The research model is depicted in Figure 1, illustrating the hypothesized relationships along with estimated path coefficients derived from Structural Equation Modeling (SEM) analysis: TSL → IC = 0.45, IC → OS = 0.37, TSL → OS = 0.21. This framework allows for a comprehensive understanding of how digitally competent leadership can foster innovation and drive long-term sustainability within organizations.

Discussion

The present study examined the impact of Tech-Savvy Leadership (TSL) on Organizational Sustainability (OS), with Innovation Capability (IC) as a mediating mechanism. The findings provide strong empirical evidence that TSL positively influences IC, which in turn enhances OS. Specifically, leaders who adopt digital tools strategically, encourage innovative thinking, and actively support technology-driven initiatives create organizational environments that are adaptive, innovative, and sustainable.

Interpretation of Findings

Tech-Savvy Leadership Enhances Innovation Capability.The results support H1, showing a significant positive effect ($\beta = 0.45$, $p < 0.001$).This confirms that leaders with high digital competence can cultivate innovation capabilities, including idea generation, digital product development, and process improvements.These findings align with prior research emphasizing the role of digital leadership in fostering organizational innovation (Kane et al., 2019; Zhang et al., 2021).Practically, leaders who embrace technology create a culture of experimentation and continuous improvement, enabling employees to leverage digital tools effectively. Innovation Capability Promotes Organizational Sustainability The positive effect of IC on OS ($\beta = 0.37$, $p < 0.001$) supports H2. Organizations with strong innovation capabilities can develop sustainable solutions, improve operational efficiency, and respond proactively to environmental and market pressures (García-Morales et al., 2012; Hossain et al., 2020). This highlights that sustainability is not only a function of policies but also of organizational competencies in innovation and technological adaptation. Mediating Role of Innovation Capability Bootstrapping results confirmed that IC partially mediates the relationship between TSL and OS (H3). This suggests that while tech-savvy leadership directly influences sustainability outcomes, a significant portion of its effect occurs indirectly through the development of innovation capability. The findings extend the dynamic capabilities theory (Teece, 2007), indicating that leadership-driven innovation is a key dynamic capability that enhances sustainable organizational performance.

Theoretical Implications

This study confirms the mediating role of IC in translating leadership behaviors into sustainability outcomes, providing empirical support for theoretical models linking leadership, innovation, and sustainability (Zhang et al., 2021). Expansion of Digital Leadership Research Most prior studies focused on technology adoption or innovation outcomes separately. This research integrates digital leadership and sustainability, demonstrating that TSL is not only beneficial for innovation but also critical for long-term organizational survival and sustainable practices (Kane et al., 2019; García-Morales et al., 2012).Contribution to Dynamic Capabilities Theory.By emphasizing innovation as a dynamic capability, the findings show that leaders' digital competencies enable organizations to sense, seize, and transform opportunities into sustainable outcomes (Teece, 2007; Hossain et al., 2020).

Practical Implications

Investing in Digital Leadership Development.Organizations should design and implement leadership development programs focusing on digital competencies, innovation management, and technological strategy.Leaders trained in digital leadership are more likely to drive innovation processes, resulting in sustainable outcomes for the organization.Fostering an Innovation-Oriented Culture.Encouraging experimentation, knowledge sharing, and cross-functional collaboration amplifies the positive effects of TSL.Firms should establish policies and incentives that reward innovative behaviors, supporting both short-term performance and long-term sustainability goals.Integration with Sustainability Strategies.Leaders should align digital initiatives with environmental, social, and operational objectives, ensuring that technology adoption contributes not only to efficiency but also to holistic organizational sustainability (Hossain et al., 2020). Implications for Technology-Intensive Industries Given the sample from technology-driven sectors, these findings highlight that TSL is particularly valuable in industries facing rapid digital transformation, where innovation capability is a key driver of competitive advantage and sustainable growth.

Limitations and Future Research Directions

While the study provides valuable insights, several limitations should be considered. Cross-sectional design: The data was collected at a single point in time, which limits causal inferences. Future studies could adopt longitudinal designs to examine the dynamic evolution of TSL, IC, and OS. Industry-specific sample: The study focused on technology-intensive industries. Subsequent research could explore other sectors to increase generalizability. Self-reported measures: Although validated scales were used, responses may be subject to social desirability bias. Future studies could incorporate multi-source data, including employee ratings or objective performance indicators. Additional mediators and moderators: Other factors, such as organizational culture, digital infrastructure, or environmental turbulence, may influence the TSL–OS relationship. Future research should investigate complex models with multiple mediators and moderators.

Conclusion

This study provides empirical evidence that Tech-Savvy Leadership is a key antecedent of Innovation Capability, which in turn significantly enhances Organizational Sustainability. Leaders who strategically adopt and integrate digital technologies, encourage creative problem-solving, and foster innovative practices create organizational environments that are more resilient, adaptive, and capable of sustaining long-term performance (Bharadwaj et al., 2013; Kane et al., 2015).The findings highlight that Innovation Capability partially mediates the relationship between Tech-Savvy Leadership and Organizational Sustainability, suggesting that leadership alone is insufficient to achieve sustainable outcomes without cultivating a strong innovation-oriented culture (Hitt et al., 2001; Teece, 2007). Organizations that invest in developing digitally competent leadership are better equipped to respond to technological disruptions, enhance operational efficiency, and integrate environmental and social considerations into strategic decision-making.

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