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Artificial Intelligence Readiness, Digital Transformation Capability, Organizational Agility, Innovation Ambidexterity, and Sustainable Competitive Advantage: A Structural Equation Modeling Approach

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A B S T R A C T

Objective: This study aimed to examine the structural relationships among artificial intelligence readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage and to evaluate the direct and indirect pathways through which these organizational capabilities contribute to long-term competitive success.

Methods and Materials: This quantitative study employed a cross-sectional survey design and Structural Equation Modeling (SEM) to test the proposed conceptual framework. The study population consisted of managers, executives, digital transformation specialists, and innovation professionals employed in medium-sized and large organizations across Canada. Using a stratified random sampling approach, data were collected from 587 participants through a structured questionnaire measuring artificial intelligence readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage. The psychometric properties of the measurement model were assessed using Confirmatory Factor Analysis (CFA), composite reliability, and convergent and discriminant validity tests. Structural relationships were examined using maximum likelihood estimation in AMOS 26, while model adequacy was evaluated through multiple goodness-of-fit indices.

Findings: The measurement model demonstrated excellent fit to the data ($\chi^2/df = 2.41$, CFI = 0.957, TLI = 0.951, IFI = 0.958, GFI = 0.921, AGFI = 0.903, RMSEA = 0.049, SRMR = 0.042). Artificial intelligence readiness exerted significant positive effects on digital transformation capability ($\beta = 0.68$, $p < .001$) and organizational agility ($\beta = 0.24$, $p < .001$). Digital transformation capability positively influenced organizational agility ($\beta = 0.53$, $p < .001$) and innovation ambidexterity ($\beta = 0.41$, $p < .001$). Organizational agility significantly enhanced

innovation ambidexterity (β = 0.47, p < .001) and sustainable competitive advantage (β = 0.34, p < .001). Innovation ambidexterity emerged as the strongest direct predictor of sustainable competitive advantage (β = 0.49, p < .001). The model explained 46% of the variance in organizational agility, 61% of the variance in innovation ambidexterity, and 69% of the variance in sustainable competitive advantage.

Conclusion: The findings indicate that artificial intelligence readiness serves as a foundational capability that strengthens digital transformation and organizational agility, which subsequently foster innovation ambidexterity and sustainable competitive advantage. The study highlights the strategic importance of integrating technological readiness, digital transformation initiatives, agile organizational structures, and balanced innovation practices to achieve enduring competitive performance in dynamic and technology-intensive business environments.

Keywords: *Artificial Intelligence Readiness; Digital Transformation Capability; Organizational Agility; Innovation Ambidexterity; Sustainable Competitive Advantage.*

1 Introduction

The contemporary business environment is characterized by unprecedented technological turbulence, accelerated digitalization, and increasingly complex competitive dynamics. Organizations across industries are experiencing substantial pressure to transform their operational structures, strategic capabilities, and innovation systems to remain competitive in rapidly evolving markets. The emergence of artificial intelligence (AI), advanced analytics, machine learning, cloud computing, and Industry 4.0 technologies has fundamentally altered the mechanisms through which firms create value, respond to environmental uncertainty, and sustain long-term performance. Consequently, organizations are increasingly investing in technological capabilities that enable them to improve decision-making, optimize business processes, enhance customer experiences, and generate innovative products and services. However, the successful realization of these benefits depends not merely on technological adoption but also on organizational readiness, strategic alignment, and the ability to integrate digital technologies into broader organizational systems (Anwari & Suzianti, 2024; Benga & Elhamma, 2024; Szelągowski & Berniak-Woźny, 2024; Utomo & Cham, 2023). As organizations navigate increasingly dynamic environments, the concept of artificial intelligence readiness has emerged as a critical antecedent of successful digital transformation initiatives. AI readiness encompasses technological infrastructure, data capabilities, workforce competencies, leadership commitment, and organizational culture that collectively facilitate effective AI implementation. Firms possessing higher levels of AI readiness are more capable of exploiting technological opportunities and responding proactively to market disruptions. Recent studies suggest that AI capabilities significantly enhance organizational adaptability, creativity, and operational effectiveness, thereby contributing to strategic renewal and competitive differentiation (Ameen et al., 2024; Bibi et al., 2025; Issa et al., 2023; Verleyen & McGinnis, 2022). Moreover, the growing strategic significance of AI has transformed it from a purely technological resource into a foundational organizational capability that influences innovation processes, knowledge management, and strategic decision-making (Rahman et al., 2026; Singh et al., 2025; Zhang & Suntrayuth, 2024).

Digital transformation has become one of the most influential strategic priorities for organizations seeking sustainable growth and resilience. Unlike traditional technology adoption initiatives, digital transformation represents a comprehensive organizational change process involving the integration of digital technologies into business models, operational processes, customer engagement mechanisms, and strategic management systems. Organizations that successfully develop digital transformation capabilities are often better positioned to sense environmental changes, respond to emerging opportunities, and maintain competitive relevance in volatile markets. Digital transformation capability reflects the extent to which organizations can effectively leverage technological resources to generate value, improve efficiency, and foster innovation. Existing research demonstrates that organizations possessing strong digital capabilities exhibit higher levels of resilience, adaptability, and innovation performance compared to their less digitally mature counterparts (Benga & Elhamma, 2024; Giudice et

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al., 2021; Hokmabadi et al., 2024; Razzak et al., 2022). The increasing prominence of digital transformation is also closely associated with the evolution of Industry 4.0, which requires organizations to develop new competencies, redesign business processes, and establish integrated technological ecosystems capable of supporting continuous innovation and strategic adaptation (Bohashko & Bohashko, 2024; Hashem, 2024; Nuerk & Dařena, 2025). As organizations continue to embrace digital technologies, researchers increasingly emphasize the importance of understanding the mechanisms through which digital transformation capabilities influence broader organizational outcomes and competitive advantage.

One of the most important organizational outcomes associated with digital transformation and technological readiness is organizational agility. Organizational agility refers to a firm's ability to rapidly sense environmental changes, adapt to evolving market conditions, and reconfigure resources in response to uncertainty and disruption. In contemporary business environments characterized by volatility and complexity, agility has become an essential organizational capability that enables firms to survive and thrive amidst constant change. Agile organizations demonstrate superior responsiveness, flexibility, and speed in decision-making, allowing them to capitalize on emerging opportunities while mitigating potential threats. Scholars have consistently argued that agility serves as a critical bridge between technological capabilities and organizational performance because technological investments alone do not automatically generate competitive benefits unless organizations possess the capacity to deploy them effectively in changing contexts (Ameen et al., 2024; Roh & Xiao, 2024; Wetering & Versendaal, 2021). Furthermore, strategic agility has been identified as a key determinant of organizational adaptability in digitally intensive environments, enabling firms to align technological innovations with evolving customer needs and market demands (Panda, 2024; Rahman et al., 2026; Ürü et al., 2024). The relationship between digital transformation and agility has therefore attracted increasing scholarly attention, particularly in the context of organizations seeking to leverage AI and advanced technologies to achieve sustainable performance outcomes.

Closely related to organizational agility is the concept of innovation ambidexterity, which refers to an organization's ability to simultaneously pursue exploratory and exploitative innovation activities. Exploratory innovation focuses on experimentation, discovery, and the development of novel products, technologies, and business models, whereas exploitative innovation emphasizes refinement, efficiency, and the optimization of existing capabilities. Organizations that successfully balance these competing innovation demands are considered ambidextrous and are generally better positioned to sustain innovation performance over time. Innovation ambidexterity has emerged as a critical strategic capability because firms operating in dynamic environments must continuously innovate while maintaining operational efficiency and resource effectiveness. Prior research demonstrates that ambidextrous organizations exhibit superior innovation outcomes, greater adaptability, and stronger competitive performance compared to organizations that focus exclusively on either exploration or exploitation (Gouda & Tiwari, 2023; Helbin & Looy, 2021; Przytuła et al., 2022). The growing importance of digital technologies has further amplified the relevance of innovation ambidexterity, as organizations increasingly rely on technological resources to support both radical innovation initiatives and incremental improvements. Empirical evidence suggests that digital capabilities, absorptive capacity, and learning mechanisms significantly contribute to the development of innovation ambidexterity, thereby enhancing organizational competitiveness and long-term sustainability (Alaskar et al., 2024; Cao et al., 2024; Hashem, 2024). Consequently, understanding the antecedents and consequences of innovation ambidexterity has become a major research priority in strategic management and innovation studies.

The integration of artificial intelligence readiness, digital transformation capability, organizational agility, and innovation ambidexterity is increasingly recognized as a critical pathway toward achieving sustainable competitive advantage. Sustainable competitive advantage refers to an organization's ability to consistently outperform competitors through valuable, rare, inimitable, and strategically relevant resources and capabilities. In contemporary digital environments, competitive advantage is no longer derived solely from physical assets or market position; rather, it increasingly depends on dynamic capabilities that enable organizations to learn, adapt, innovate, and respond effectively to environmental changes. Dynamic capability theory suggests that firms must continuously renew their competencies and reconfigure their resources to maintain strategic relevance in rapidly changing markets (Duwe, 2021; Razzak et al., 2022; Roh & Xiao, 2024). Within this framework, AI readiness and digital transformation capability can be viewed as foundational organizational

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resources that facilitate the development of higher-order capabilities such as agility and innovation ambidexterity. These higher-order capabilities, in turn, contribute to sustainable competitive advantage by enhancing organizational responsiveness, innovation capacity, and strategic flexibility (Singh et al., 2025; Ürü et al., 2024; Zhang & Suntrayuth, 2024). Recent studies have demonstrated that organizations capable of integrating technological capabilities with agile and ambidextrous organizational practices are more likely to achieve superior innovation performance, business resilience, and long-term competitive success (Alaskar et al., 2024; Ameen et al., 2024; Rahman et al., 2026).

Although substantial progress has been made in understanding the individual effects of AI capability, digital transformation, organizational agility, and innovation ambidexterity, important theoretical and empirical gaps remain. Much of the existing literature has examined these constructs independently or investigated only selected relationships among them. For example, prior studies have explored the association between digital transformation and innovation performance, the role of agility in organizational adaptation, or the influence of ambidexterity on competitive outcomes. However, relatively few studies have developed and empirically tested comprehensive models that simultaneously integrate AI readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage within a unified theoretical framework (Jha, 2023; Ragazou et al., 2022; Utomo & Cham, 2023). Furthermore, the accelerating adoption of artificial intelligence technologies has created new organizational dynamics that remain insufficiently understood, particularly regarding how AI readiness influences downstream strategic capabilities and competitive outcomes. Scholars increasingly call for research that investigates the interplay among technological readiness, digital capabilities, agility, and innovation mechanisms in shaping organizational success in the digital era (Adhiatma et al., 2023; Aldianto et al., 2021; Ali, 2023). Addressing these gaps is essential for advancing theoretical understanding and providing practical guidance for organizations seeking to navigate digital transformation successfully. Therefore, the present study aims to examine the structural relationships among artificial intelligence readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage using a structural equation modeling approach.

2 Methods and Materials

This study employed a quantitative, cross-sectional research design using Structural Equation Modeling (SEM) to examine the relationships among artificial intelligence readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage in Canadian organizations. The study focused on medium-sized and large organizations operating in knowledge-intensive industries, including information technology, financial services, advanced manufacturing, telecommunications, healthcare technology, and professional consulting services. These sectors were selected because of their active engagement with digital technologies and ongoing investments in artificial intelligence-driven initiatives.

The target population consisted of managers, department heads, digital transformation specialists, innovation managers, and senior executives who possessed sufficient knowledge regarding their organizations' technological infrastructure, innovation activities, and strategic capabilities. A stratified random sampling approach was adopted to ensure representation across different industries and organizational sizes. Data were collected from organizations located in major Canadian economic centers, including Toronto, Vancouver, Montreal, Calgary, and Ottawa. Prior to participation, respondents were informed about the objectives of the study, the voluntary nature of participation, and the confidentiality of their responses.

A total of 650 questionnaires were distributed electronically through professional networks, industry associations, and organizational contacts. After excluding incomplete responses and questionnaires exhibiting substantial missing data or response inconsistencies, 587 valid questionnaires were retained for the final analysis, resulting in a response rate of 90.3%. The final sample consisted of professionals with diverse managerial responsibilities and varying levels of experience in digital transformation and innovation management. The sample size exceeded the minimum requirements recommended for structural equation modeling, thereby ensuring adequate statistical power for model estimation and hypothesis testing.

Data were collected using a structured survey instrument consisting of five standardized scales measuring the primary constructs of the study. All questionnaire items were assessed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire

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was administered electronically and was subjected to expert review prior to distribution to ensure clarity, relevance, and contextual suitability for Canadian organizations.

Artificial Intelligence Readiness was measured using an adapted version of the Artificial Intelligence Readiness Scale developed by Aydiner et al. (2019) and subsequently refined in organizational AI adoption research. The scale consisted of 18 items distributed across four dimensions, including technological infrastructure readiness, data management capability, workforce AI competence, and organizational support for AI implementation. Sample items assessed the availability of AI-related resources, employee preparedness for AI integration, and strategic commitment toward AI deployment. Higher scores indicated greater organizational readiness for artificial intelligence adoption. Previous studies have reported satisfactory psychometric properties for this instrument, with Cronbach's alpha coefficients consistently exceeding 0.80 and evidence supporting both convergent and discriminant validity.

Digital Transformation Capability was assessed using the Digital Transformation Capability Scale developed by Warner and Wäger (2019). The instrument contained 16 items measuring an organization's ability to integrate digital technologies into business processes, customer interactions, operational systems, and strategic decision-making. The scale encompassed dimensions such as digital leadership, technological integration, process digitization, and organizational adaptability. Respondents evaluated the extent to which their organizations effectively leveraged digital technologies to achieve strategic objectives. Prior empirical investigations have demonstrated strong reliability and validity for the instrument across different organizational contexts, with reported internal consistency coefficients above 0.85.

Organizational Agility was measured using the Organizational Agility Scale developed by Sharifi and Zhang (1999) and subsequently validated in contemporary organizational research. The scale comprised 15 items assessing responsiveness, flexibility, speed of decision-making, and adaptability to environmental changes. The instrument evaluated an organization's capacity to recognize emerging opportunities and threats while rapidly adjusting resources and processes. Higher scores reflected greater organizational agility. Previous studies have consistently reported acceptable construct validity and reliability, with Cronbach's alpha values ranging between 0.82 and 0.91.

Innovation Ambidexterity was measured using the Innovation Ambidexterity Scale developed by Jansen et al. (2006). This instrument consisted of 14 items measuring two complementary dimensions of organizational innovation: exploratory innovation and exploitative innovation. Exploratory innovation referred to activities associated with experimentation, new knowledge generation, and radical innovation, whereas exploitative innovation reflected efforts aimed at refinement, efficiency improvement, and incremental innovation. Respondents rated the extent to which their organizations simultaneously pursued both forms of innovation. Previous research has established the scale's reliability and validity in studies examining innovation performance and strategic management, with internal consistency values typically exceeding 0.80.

Sustainable Competitive Advantage was measured using the Sustainable Competitive Advantage Scale adapted from the work of Vorhies and Morgan (2005). The instrument included 12 items evaluating an organization's ability to maintain superior performance relative to competitors over time. The scale assessed dimensions such as market position, strategic flexibility, customer value creation, operational excellence, and long-term performance sustainability. Higher scores indicated stronger sustainable competitive advantage. Prior studies have confirmed the scale's robust psychometric properties, demonstrating high levels of reliability, convergent validity, and predictive validity across various industries.

To establish content validity, the complete questionnaire was reviewed by a panel of academic experts in strategic management, digital transformation, and organizational behavior. A pilot study involving 30 managers from Canadian organizations was conducted prior to the main data collection phase. Feedback obtained during the pilot phase resulted in minor wording modifications to improve clarity and comprehensibility. The pilot findings also indicated satisfactory reliability for all constructs, with Cronbach's alpha values exceeding the recommended threshold of 0.70.

Data analysis was conducted using SPSS version 29 and AMOS version 26. Initially, descriptive statistics, including means, standard deviations, skewness, and kurtosis values, were calculated to examine the distributional characteristics of the data. Missing values, outliers, and assumptions of normality were assessed prior to conducting the main analyses. Reliability analysis was performed using Cronbach's alpha and composite reliability coefficients to evaluate the internal consistency of the measurement scales.

Confirmatory Factor Analysis (CFA) was conducted to assess the measurement model and verify the factorial structure of the latent constructs. Convergent validity was

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evaluated through factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR), while discriminant validity was examined using the Fornell-Larcker criterion and inter-construct correlations. Model fit was assessed using multiple goodness-of-fit indices, including the Chi-square to degrees-of-freedom ratio (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Following confirmation of the measurement model, Structural Equation Modeling was employed to test the hypothesized relationships among artificial intelligence readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage. Direct, indirect, and total effects were estimated simultaneously. The significance of structural paths was evaluated using maximum likelihood estimation procedures and bootstrap resampling with 5,000 iterations to obtain bias-corrected confidence intervals. Mediation effects were examined to determine whether organizational agility and innovation ambidexterity functioned as intervening mechanisms linking artificial intelligence readiness and digital transformation capability to sustainable competitive advantage.

The overall structural model was evaluated according to established SEM criteria, and explanatory power was assessed using squared multiple correlations (R^2) for endogenous variables. Statistical significance was determined at the 0.05 level. The analytical procedures provided a comprehensive assessment of both the measurement and structural components of the proposed model, enabling rigorous examination of the relationships among the study variables within the context of Canadian organizations undergoing digital transformation and artificial intelligence adoption.

3 Findings and Results

Data were collected from 587 managers, executives, digital transformation specialists, and innovation professionals employed in medium-sized and large organizations across Canada. Of the respondents, 352 (59.97%) were male and 235 (40.03%) were female. Regarding age distribution, 114 participants (19.42%) were between 25 and 34 years old, 238 participants (40.55%) were between 35 and 44 years old, 169 participants (28.79%) were between 45 and 54 years old, and 66 participants (11.24%) were 55 years old or older. Concerning educational attainment, 118 respondents (20.10%) held a bachelor's degree, 351 respondents (59.80%) held a master's degree, and 118 respondents (20.10%) possessed doctoral qualifications. In terms of organizational position, 198 participants (33.73%) occupied senior management roles, 251 participants (42.76%) were middle managers, and 138 participants (23.51%) worked as digital transformation or innovation specialists. The average professional experience of the respondents was 11.83 years (SD = 4.97), indicating that the sample consisted predominantly of experienced professionals capable of providing informed evaluations regarding their organizations' artificial intelligence readiness, digital transformation capabilities, agility, innovation practices, and competitive positioning.

Table 1

Descriptive Statistics, Reliability, and Convergent Validity of the Study Variables

Variable	Mean	SD	Cronbach's Alpha	Composite Reliability (CR)	AVE
Artificial Intelligence Readiness	3.87	0.69	0.91	0.93	0.68
Digital Transformation Capability	3.94	0.71	0.92	0.94	0.71
Organizational Agility	3.82	0.67	0.89	0.91	0.64
Innovation Ambidexterity	3.78	0.73	0.90	0.92	0.66
Sustainable Competitive Advantage	3.85	0.70	0.93	0.94	0.73

Table 1 presents the descriptive statistics and measurement quality indicators for the principal study constructs. The findings revealed that Digital Transformation Capability exhibited the highest mean score (M = 3.94, SD = 0.71), suggesting that participating organizations demonstrated relatively advanced digitalization efforts and technological integration practices. Artificial Intelligence Readiness also showed a relatively high mean value (M = 3.87, SD = 0.69), indicating favorable organizational preparedness for AI adoption. Sustainable Competitive Advantage recorded a mean score of 3.85, while Organizational Agility and Innovation Ambidexterity

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showed mean values of 3.82 and 3.78, respectively. Reliability analysis demonstrated excellent internal consistency across all constructs, with Cronbach's alpha coefficients ranging from 0.89 to 0.93, substantially exceeding the recommended threshold of 0.70. Similarly, Composite Reliability values varied between 0.91 and 0.94, confirming strong construct reliability. Convergent validity was also supported because all Average Variance Extracted values exceeded the recommended criterion of 0.50, ranging from 0.64 to 0.73. Collectively, these findings provide evidence that the measurement model possesses satisfactory psychometric properties and that the latent variables are suitable for subsequent structural equation modeling analyses.

Table 2

Correlation Matrix and Discriminant Validity Assessment

Variable	1	2	3	4	5
1. Artificial Intelligence Readiness	0.825				
2. Digital Transformation Capability	0.648**	0.843			
3. Organizational Agility	0.594**	0.687**	0.800		
4. Innovation Ambidexterity	0.566**	0.641**	0.718**	0.812	
5. Sustainable Competitive Advantage	0.538**	0.602**	0.703**	0.741**	0.854

The results shown in Table 2 indicate significant and positive relationships among all study variables. The strongest observed correlation was between Innovation Ambidexterity and Sustainable Competitive Advantage ($r = 0.741$, $p < .001$), suggesting that organizations capable of simultaneously pursuing exploratory and exploitative innovation activities tend to achieve stronger long-term competitive positions. Organizational Agility also demonstrated a strong positive association with Sustainable Competitive Advantage ($r = 0.703$, $p < .001$), highlighting the strategic importance of responsiveness and adaptability in dynamic environments. Digital Transformation Capability showed substantial correlations with Organizational Agility ($r = 0.687$, $p < .001$) and Innovation Ambidexterity ($r = 0.641$, $p < .001$), indicating that digitally mature organizations are better positioned to respond to environmental changes and balance innovation activities. The diagonal values represent the square roots of AVE for each construct and exceed all corresponding inter-construct correlations, thereby satisfying the Fornell-Larcker criterion and confirming discriminant validity. These results provide initial support for the theoretical relationships proposed in the conceptual model.

Table 3

Measurement Model Fit Indices

Fit Index	Obtained Value	Recommended Value
χ^2/df	2.41	< 3.00
CFI	0.957	> 0.90
TLI	0.951	> 0.90
IFI	0.958	> 0.90
GFI	0.921	> 0.90
AGFI	0.903	> 0.90
RMSEA	0.049	< 0.08
SRMR	0.042	< 0.08

The confirmatory factor analysis results demonstrated an excellent fit between the measurement model and the observed data. As shown in Table 3, the chi-square to degrees-of-freedom ratio was 2.41, which falls below the recommended threshold of 3.00 and indicates acceptable model parsimony. Incremental fit indices also demonstrated excellent performance, with CFI = 0.957, TLI = 0.951, and IFI = 0.958, all substantially exceeding the recommended benchmark of 0.90. Furthermore, GFI and AGFI values of 0.921 and 0.903, respectively, indicated strong overall model fit. Error-based indices also supported model adequacy, with RMSEA = 0.049 and SRMR = 0.042, both comfortably below accepted cut-off values. These findings confirm that the observed indicators adequately represent

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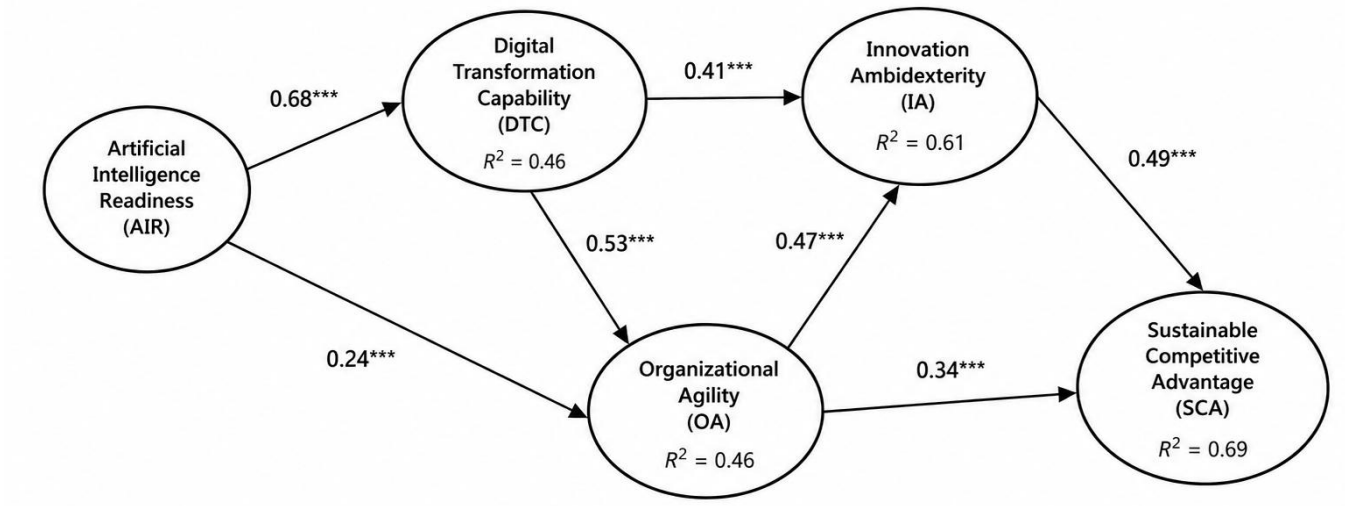
their intended latent constructs and provide a solid foundation for testing the structural relationships among the study variables.

Figure 1

Structural Equation Model of Artificial Intelligence Readiness, Digital Transformation Capability, Organizational Agility, Innovation Ambidexterity, and Sustainable Competitive Advantage



The structural model illustrated in Figure 1 demonstrated statistically significant relationships among all major constructs. Artificial Intelligence Readiness exerted a significant positive effect on Digital Transformation Capability (β = 0.68, p < .001) and Organizational Agility (β = 0.24, p < .001). Digital Transformation Capability also significantly influenced Organizational Agility (β = 0.53, p < .001) and Innovation Ambidexterity (β = 0.41, p < .001). Furthermore, Organizational Agility exhibited a strong positive effect on Innovation Ambidexterity (β = 0.47, p < .001) and Sustainable Competitive Advantage (β = 0.34, p < .001). Innovation Ambidexterity emerged as the strongest direct predictor of Sustainable Competitive Advantage (β = 0.49, p < .001). The model accounted for 46% of the variance in Organizational Agility, 61% of the variance in Innovation Ambidexterity, and 69% of the variance in Sustainable Competitive Advantage, indicating substantial explanatory power. These findings suggest that organizations enhance their competitive advantage not only through technological readiness and digital transformation efforts but also through the development of agile structures and balanced innovation capabilities.

Table 4

Structural Path Coefficients and Hypothesis Testing Results

Hypothesized Relationship	β	SE	CR	p-value	Result
AI Readiness → Digital Transformation Capability	0.68	0.05	13.87	<0.001	Supported
AI Readiness → Organizational Agility	0.24	0.04	5.96	<0.001	Supported
Digital Transformation Capability → Organizational Agility	0.53	0.05	10.92	<0.001	Supported
Digital Transformation Capability → Innovation Ambidexterity	0.41	0.04	9.84	<0.001	Supported
Organizational Agility → Innovation Ambidexterity	0.47	0.04	11.28	<0.001	Supported
Organizational Agility → Sustainable Competitive Advantage	0.34	0.05	7.33	<0.001	Supported
Innovation Ambidexterity → Sustainable Competitive Advantage	0.49	0.05	10.17	<0.001	Supported

The hypothesis testing results presented in Table 4 indicate that all proposed relationships were statistically significant and empirically supported. The strongest direct relationship was observed between Artificial Intelligence Readiness and Digital Transformation Capability (β = 0.68), emphasizing the foundational role of AI preparedness in facilitating successful digital transformation initiatives. Innovation Ambidexterity demonstrated the largest direct

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effect on Sustainable Competitive Advantage (β = 0.49), underscoring the strategic importance of simultaneously pursuing exploratory and exploitative innovation activities. Organizational Agility also emerged as a critical mediator within the model, significantly influencing both Innovation Ambidexterity and Sustainable Competitive Advantage. All critical ratio values exceeded the recommended threshold of ±1.96, and all path coefficients were statistically significant at $p < .001$. The consistency and magnitude of these relationships provide strong empirical support for the proposed theoretical framework and suggest that organizations seeking long-term competitive success should integrate artificial intelligence readiness, digital transformation capability, agility, and innovation ambidexterity into a coherent strategic architecture. Collectively, the structural model findings confirm that technological preparedness and digital capabilities serve as essential antecedents of organizational agility and innovation excellence, which subsequently contribute to sustainable competitive advantage in highly dynamic and technology-intensive business environments.

4 Discussion

The purpose of this study was to examine the structural relationships among artificial intelligence readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage within Canadian organizations. The findings revealed that all hypothesized relationships were statistically significant and that the proposed structural model explained substantial proportions of variance in organizational agility, innovation ambidexterity, and sustainable competitive advantage. Specifically, artificial intelligence readiness positively influenced digital transformation capability and organizational agility, digital transformation capability positively affected organizational agility and innovation ambidexterity, organizational agility enhanced both innovation ambidexterity and sustainable competitive advantage, and innovation ambidexterity emerged as the strongest direct predictor of sustainable competitive advantage. These findings collectively suggest that technological readiness and digital capabilities serve as foundational resources that facilitate the development of higher-order strategic capabilities, ultimately contributing to long-term organizational success.

One of the most important findings of the study was the strong positive effect of artificial intelligence readiness on digital transformation capability. This result indicates that organizations possessing adequate technological infrastructure, data management systems, employee competencies, and leadership commitment toward AI implementation are significantly more capable of executing successful digital transformation initiatives. Artificial intelligence readiness provides organizations with the technological and organizational foundation necessary for integrating advanced digital technologies into operational and strategic processes. In practical terms, organizations cannot effectively transform digitally without first developing the readiness conditions that support the deployment and utilization of AI-driven systems. This finding aligns with the growing body of literature emphasizing the strategic role of AI capabilities in facilitating organizational transformation and technological adaptation. Previous studies have similarly argued that AI capability enhances organizational learning, technological flexibility, and strategic responsiveness, thereby enabling more effective digital transformation outcomes (Ameen et al., 2024; Bibi et al., 2025; Issa et al., 2023; Verleyen & McGinnis, 2022). Furthermore, research has highlighted that organizations equipped with advanced AI capabilities are better positioned to exploit digital opportunities and respond to technological disruptions, supporting the present findings (Singh et al., 2025; Zhang & Suntrayuth, 2024).

The findings also demonstrated that artificial intelligence readiness exerts a significant positive effect on organizational agility. This result suggests that organizations prepared for AI adoption possess superior capabilities to sense environmental changes, process information rapidly, and respond effectively to emerging opportunities and threats. AI technologies enable organizations to analyze large volumes of data, automate routine processes, and generate predictive insights that facilitate faster and more informed decision-making. Consequently, AI-ready organizations are better equipped to develop agile structures and adaptive processes that enhance organizational responsiveness. This finding supports previous arguments that technological readiness contributes directly to organizational flexibility and strategic agility in dynamic business environments (Ameen et al., 2024; Ürü et al., 2024). The result is also consistent with studies emphasizing the importance of digital intelligence and technological capabilities as enablers of organizational adaptation and responsiveness (Roh & Xiao, 2024; Wetering & Versendaal, 2021). As environmental uncertainty continues to increase across industries, AI readiness appears to function as a

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critical strategic asset supporting organizational agility and resilience.

Another important finding was the substantial influence of digital transformation capability on organizational agility. Organizations with higher levels of digital transformation capability demonstrated greater responsiveness, adaptability, and flexibility in dealing with changing market conditions. Digital transformation enables organizations to streamline processes, improve communication flows, enhance information accessibility, and increase operational efficiency, all of which contribute to agility. The result suggests that digital transformation should not be viewed merely as a technological initiative but rather as a strategic capability that reshapes organizational structures and behaviors. This finding corroborates earlier studies showing that digital transformation strengthens dynamic capabilities and improves organizational adaptability under conditions of uncertainty (Hokmabadi et al., 2024; Razzak et al., 2022). Similar conclusions have been reported in studies emphasizing that digital technologies enhance organizational responsiveness by facilitating knowledge sharing, collaboration, and rapid decision-making (Giudice et al., 2021; Utomo & Cham, 2023). Moreover, the findings support the argument that digital transformation serves as an essential mechanism through which organizations develop the agility required to compete in increasingly digital and turbulent environments (Benga & Elhamma, 2024; Nuerk & Dařena, 2025).

The study further revealed that digital transformation capability significantly enhances innovation ambidexterity. This finding indicates that organizations possessing strong digital capabilities are better able to balance exploratory and exploitative innovation activities simultaneously. Digital transformation provides organizations with access to new knowledge, technological resources, and collaborative networks that facilitate both experimentation and operational refinement. Through digital technologies, organizations can pursue radical innovations while simultaneously improving existing products, services, and processes. This dual capability is particularly important in dynamic environments where organizations must continuously innovate while maintaining efficiency and competitiveness. The result is consistent with prior studies suggesting that digital transformation serves as a catalyst for innovation and organizational renewal (Giudice et al., 2021; Hashem, 2024). Similarly, research on Industry 4.0 and digital ecosystems has demonstrated that digitally mature organizations exhibit stronger ambidextrous capabilities because they possess the resources and flexibility necessary to support multiple innovation pathways simultaneously (Alaskar et al., 2024; Bohashko & Bohashko, 2024; Jha, 2023).

The positive effect of organizational agility on innovation ambidexterity represents another significant contribution of this study. Agile organizations are characterized by flexibility, responsiveness, and a willingness to adapt to changing circumstances. Such characteristics create favorable conditions for balancing exploration and exploitation activities because agile firms can allocate resources dynamically, respond quickly to emerging opportunities, and integrate new knowledge into existing operations. The findings indicate that agility functions as a crucial mechanism through which organizations transform technological and digital capabilities into innovation outcomes. This result supports previous research suggesting that agility enhances organizational learning and innovation performance by enabling firms to navigate complex and uncertain environments more effectively (Panda, 2024; Rahman et al., 2026). Moreover, studies on strategic ambidexterity have consistently highlighted the role of agility in facilitating simultaneous innovation and operational excellence (Przytuła et al., 2022; Ragazou et al., 2022). The present findings therefore reinforce the theoretical proposition that agility and ambidexterity are closely interconnected strategic capabilities that mutually reinforce one another.

The results also demonstrated that organizational agility significantly contributes to sustainable competitive advantage. Organizations capable of adapting rapidly to environmental changes, customer demands, and technological developments appear better positioned to maintain superior performance over time. Agility enables organizations to exploit emerging opportunities more effectively, mitigate risks associated with uncertainty, and continuously align organizational resources with evolving market conditions. In increasingly volatile business environments, the ability to respond quickly and effectively has become a critical determinant of competitive success. This finding is consistent with dynamic capability theory, which emphasizes the importance of organizational adaptability and resource reconfiguration in sustaining competitive advantage. Previous studies similarly report that agility strengthens organizational resilience, strategic responsiveness, and long-term performance outcomes (Aldianto et al., 2021; Roh & Xiao, 2024). Furthermore, empirical evidence suggests that agile organizations are

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more successful in navigating technological disruptions and maintaining competitive relevance in rapidly changing markets (Ameen et al., 2024; Rahman et al., 2026; Ürü et al., 2024).

Perhaps the most notable finding of the study was that innovation ambidexterity emerged as the strongest direct predictor of sustainable competitive advantage. This result highlights the strategic importance of balancing exploratory and exploitative innovation activities in achieving long-term organizational success. Organizations that simultaneously pursue innovation, experimentation, and efficiency improvement are better able to generate sustainable value, respond to market changes, and differentiate themselves from competitors. Innovation ambidexterity enables firms to avoid the risks associated with excessive focus on either exploration or exploitation while maintaining a dynamic balance that supports continuous growth and adaptation. This finding aligns strongly with previous research emphasizing the central role of ambidexterity in organizational performance and competitiveness (Gouda & Tiwari, 2023; Hashem, 2024; Helbin & Looy, 2021). Similar conclusions have been reported by scholars investigating the relationships among digital transformation, innovation capability, and strategic performance, who argue that ambidextrous organizations consistently outperform their less balanced counterparts (Alamsjah & Yunus, 2022; Alaskar et al., 2024; Cao et al., 2024). The result also supports emerging evidence suggesting that innovation ambidexterity serves as a key strategic capability in achieving sustainable innovation and competitive differentiation in the digital era (Ali, 2023; Singh et al., 2025; Zhang & Suntrayuth, 2024).

5 Conclusion

Taken together, the findings provide strong empirical support for the integrated framework proposed in this study. The results suggest that artificial intelligence readiness functions as a foundational capability that strengthens digital transformation efforts and organizational agility. Digital transformation capability subsequently enhances agility and innovation ambidexterity, while agility serves as a critical intermediary mechanism linking technological capabilities with innovation outcomes. Ultimately, innovation ambidexterity and organizational agility contribute substantially to sustainable competitive advantage. These findings extend existing knowledge by demonstrating how technological readiness, digital transformation, agility, and ambidexterity operate as interconnected strategic capabilities rather than isolated organizational phenomena. The study therefore contributes to the growing literature on digital transformation and strategic management by providing a comprehensive explanation of how organizations can leverage emerging technologies to achieve enduring competitive success.

Several limitations should be acknowledged when interpreting the findings of this study. First, the study employed a cross-sectional design, which limits the ability to establish causal relationships among the investigated variables. Longitudinal studies would provide stronger evidence regarding the temporal dynamics of AI readiness, digital transformation capability, organizational agility, innovation ambidexterity, and sustainable competitive advantage. Second, data were collected through self-reported questionnaires, which may introduce common method bias and social desirability effects. Although procedural measures were implemented to reduce these concerns, some degree of response bias may remain. Third, the study was conducted within Canadian organizations, which may limit the generalizability of the findings to other national and cultural contexts. Finally, the study focused on a selected set of organizational capabilities and did not incorporate potentially influential contextual variables such as organizational culture, leadership style, environmental uncertainty, or industry characteristics.

Future research should examine the proposed relationships using longitudinal research designs to better understand the causal mechanisms and developmental trajectories of digital transformation and organizational capability building. Researchers may also investigate potential moderating variables, including organizational size, industry type, technological intensity, and environmental turbulence, to identify conditions under which the proposed relationships become stronger or weaker. Comparative cross-national studies would be particularly valuable for exploring how institutional and cultural differences influence the effectiveness of AI readiness and digital transformation initiatives. In addition, future studies could incorporate emerging constructs such as digital resilience, AI governance, ethical AI implementation, organizational learning capability, and knowledge management systems to further enrich theoretical understanding of organizational competitiveness in the digital era.

Managers seeking sustainable competitive advantage should view artificial intelligence readiness as a strategic

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organizational investment rather than a purely technological initiative. Organizations should prioritize the development of robust digital infrastructures, employee AI competencies, and leadership support mechanisms that facilitate effective technology adoption. Simultaneously, firms should strengthen their digital transformation capabilities by integrating digital technologies into core business processes and strategic decision-making systems. Organizational leaders should also foster agile structures that encourage flexibility, rapid decision-making, and adaptive resource allocation. Finally, organizations should actively cultivate innovation ambidexterity by creating environments that support both exploratory innovation and operational excellence. By developing these interconnected capabilities simultaneously, organizations can enhance their adaptability, innovation performance, and long-term competitive position in increasingly dynamic and technology-driven markets.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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