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The Role of Technology Strategy, Agile Process Re-Engineering, and Digital Innovation in Achieving Competitive Advantage: Evidence from United Arab Emirates

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ABSTRACT

This study examined the impact of technology strategy execution, agile process re-engineering, and digital innovation on competitive advantage in the telecom sector of UAE. Primary data were collected from a sample of 365 senior managers, consultants, and technology executives across leading telecom operators and consulting firms in UAE. Data were analyzed using Structural Equation Modeling (SEM) to test the hypothesized framework, drawing on literature from digital transformation, strategic management, and innovation theory. The results revealed that technology strategy execution significantly strengthened competitive advantage by aligning innovation with business goals, improving efficiency, and enabling scalable transformation programs. Agile process re-engineering also had a strong positive effect on competitive advantage. Furthermore, digital innovation—including AI applications, IoT solutions, 5G adoption, and cloud integration—was found to be a key driver of differentiation, enabling telecom firms to provide future-ready services and respond quickly to market changes. Collectively, these three independent variables explained a substantial proportion of variance in competitive advantage, confirming the strategic importance of digital and agile practices in telecom transformation.

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1.0 Introduction

The last two decades have witnessed a radical transformation of the world's telecommunications industry, brought about by rapid technological change, changing consumer preferences, and increasingly intense competition. In modern times, telecom operators act, on one hand, as service providers and on the other, as enablers of digital ecosystems that catalyze economic diversification, knowledge exchange, and national development agendas. This has been especially true in emerging markets like UAE, where the sector stands at the heart of ambitious policy initiatives like Vision 2030, which put digital transformation, innovation, and advanced connectivity at the forefront of sustainable growth (Mani & Goniewicz, 2024). Within this evolving environment, telecom operators are facing the dual challenge of modernizing legacy infrastructures while at the same time adopting disruptive technologies that challenge business models and redefine the customer experience. Against this background, technology adoption choices, process agility and digital innovation capabilities have become important drivers of long-term competitive advantage (Xu et al., 2024).

At the heart of this change is technology strategy-the process that organizations use to align technology investments with business objectives and market demands. A clear technology strategy can help organisations to develop scalable infrastructures, priorities innovation programmes, and orchestrate resources efficiently across digital transformation programmes. This is especially true in the telecom industry where companies are making large investments in next-generation infrastructure such as 5G, cloud computing and IoT platforms and need to ensure that these investments translate into real value in terms of increased customer satisfaction, cost efficiencies and new revenue streams (Sacco, 2020). The strategic management literature has highlighted the importance of a close alignment between technology strategy and organisational goals as being instrumental in achieving above-average performance outcomes for firms. Yet in practice, many organisations have difficulty bridging the gap between adoption and strategic execution, and therefore struggle to unlock sustainable competitive advantages (Alonge et al., 2023).

Also important is agile process redesign (agile process re-engineering), i.e. redesigning and adapting organisational processes to enable flexibility, responsiveness and collaboration. Agility has emerged as a buzzword as companies are faced with uncertainty, volatility, and changing times. In the telecom industry, where the cycle of change in customer expectations is relatively short and the technology cycles even shorter, agility is no longer a choice but a requirement for survival. By applying agile concepts to the design of processes, organizations can increase the speed at which products and services are delivered, respond rapidly to feedback from customers, and foster cross-functional cooperation that leads to innovation (Upadhyay et al., 2024). In the literature on organisational agility, agility is widely viewed as a mediator between technological investments and business performance as agility assures the effective mobilization of technological resources to meet the changing needs of the market. In the highly competitive Saudi telecom landscape, where operators are vying to deploy new services and capture digital markets, process agility can provide a differentiator and market response engine (Stephens et al., 2023).

Digital innovation is a second important pillar for the creation of competitive advantage.

Defined simply as the creation and deployment of new digital technologies, such as artificial intelligence, machine learning, Internet of Things (IoT), blockchain, and cloud computing, digital innovation is helping organisations reimagine their products, services, and business models. In the case of telecom companies, digital innovation is responsible for the shift from traditional connectivity providers to integrated digital solution providers. For example, the spread of 5G technology will facilitate the expansion of smart cities, driverless cars, and immersive customer experiences, and create new opportunities for value creation (Nleya et al., 2025). Likewise, as operators migrate to cloud and artificial intelligence applications, they can optimize operations, predict how customers behave, and design targeted offerings. From a theoretical point of view, digital innovation is often tied to dynamic capabilities theory, which argues that sustainable competitive advantage can be achieved by firms through ongoing integration, reconfiguration, and renewal of their resources in the face of environmental change. Hence, digital innovation not only enhances existing market positions, but also positions firms to proactively respond to future disturbances (Dovbischuk, 2022).

While these factors have recently gained prominence as important elements in the acquisition of competitive advantage, literature exploring their combined role has been scarce, especially in the context of the telecommunication sector in UAE. Much of the literature generated thus far has either isolated technology strategy, agility, or digital innovation and has not considered their relative relationships and the need to contextualize them within the specific institutional and cultural context of UAE. Second, although data from research in western and Asian markets offer valuable insights, conclusions drawn from those markets should not be transferred uncritically to the Middle Eastern context where regulatory frameworks, market and digital maturity are different (Alrayes, 2021). Telecommunications in UAE is characterized by a large concentration of government intervention, huge investments in national digital infrastructure, and an ambitious approach toward the adoption of disruptive technologies. These factors call for empirical research capturing how local telecom operators combine strategic, operational and innovative practises to realize sustainable competitive advantage (Salamzadeh et al., 2022).

Another gap in the literature relates to the poor empirical testing of theoretical relationships between technology strategy, agile process re-engineering, digital innovation and competitive advantage. Although conceptual models propose strong relationships among these constructs, relatively few studies have used rigorous quantitative methods such as Structural Equation Modelling (SEM) in order to test these relationships empirically. Semantic Embedding Model (SEM): SEM can capture complex causal pathways and mediation effects, and can provide a more nuanced view of how digital and agile practices lead to competitive outcomes (Yoo et al., 2024). By using SEM to analyse primary data obtained from senior managers, consultants and technology executives, this study makes a stronger and context-based contribution to the body of knowledge. The research problem is therefore the absence of synthesized empirical evidence for the influence of technology strategy execution, agile process re-engineering, and digital innovation group interaction on competitive advantage in the Saudi telecommunication industry. For scholars the research provides valuable theoretical contributions to the literature by testing and validating

theoretical relationships in a Middle Eastern context, and thus improving the generalizability of strategic management and innovation theory in other settings. Finally, the results contribute to the literature on digital transformation by revealing how consulting-led change processes, technological investments and agile practices interactively influence sustainable competitive advantage in a rapidly evolving industry.

2.0 Literature Review

The theoretical foundations of this study are based on the resource-based view (RBV) and dynamic capabilities theory, both of which emphasize how firms gain competitive advantage from unique and hard-to-copy resources and how firms are able to re-combine such resources in changing environments. Empirical research on technology strategy also reveals that the strategy has a substantial role to play in performance outcomes and the maintenance of competitive advantage. The literature supports the argument that companies that have well-defined technology strategies have been better placed to manage the alignment of technology investments to business objectives in order to mobilize resources efficiently. Regarding network modernization strategy, infrastructure investments, platform approach based on ecosystem, and telecommunication perspective, it was identified that implementation is a critical component of strategy that can affect service quality, retention and revenue diversification significantly. Moreover, the argument is that technology strategy creates the scaffolding of digital transformation activities by establishing priorities, capital allocation, and offering governance mechanisms that minimize the risks of undertaking digital adoption at scale (Xu et al., 2025). In the context of an emerging economy, technology strategy is viewed as a significant tool to bridging the digital divide, and defining the access of firms to global innovation networks (Keshavarz et al., 2021).

In the telecommunication industry, for instance, process agility has been shown to lower the time to market for new services, increase customer engagement and facilitate cross-functional collaboration that leads to innovation outcomes (Saragih et al., 2021). In addition, research indicates that agility mediates the relationship between technological investments and performance, and that agility allows resources to be utilized effectively rather than left idle. Within the Saudi context, where businesses are in a rapidly changing regulatory environment and experience pressure for quick digitalization, agile process re-engineering becomes especially critical to support ongoing competitive advantage (Al Bahri, 2022).

The centrality of digital innovation to organisational transformation has seen it become an important theme in both practitioner and academic literature. Broadly defined as the emergence or use of new digital technologies, digital innovation changes how value is created and delivered, how customers experience companies, and how new business models operate. Empirical literature has emphasized that digital innovation represents one of the main channels for firms to provide new services, to be more efficient and to be distinctive in highly competitive markets. In the telecommunications field, it is claimed that the introduction of 5G network, IoT platform, cloud computing, artificial intelligence are the major disruptive innovations. Further literature highlights that digital innovation is not only a technological imperative, it is also a strategic one with the need to change culture, ensure leadership buy-in, and provide governance frameworks to control risks

and optimise returns (Wang & Zhang, 2025). In emerging economies, such as UAE, digital innovation has been associated with broader development agendas as part of smart city and industrial automation programmes and digital inclusion programmes aligned with national economic diversification agendas. These findings suggest that telecom operators who make the choice to innovate digitally are more likely to attain long-term competitive advantage through fast-changing markets (Wang & Zhang, 2025).

Empirical work also points towards the interrelationship between technology strategy, agile process re-engineering and digital innovation, but they are mostly studied in partial combinations rather than as a holistic model. Studies have indicated that technology strategy provides the directional context required for identifying innovation opportunities, and agility provides the context for ensuring that innovation initiatives are efficiently and effectively implemented. Research has also shown that digital innovation improves technology strategies outcomes by creating differentiated offerings that are sensitive to customer needs and agile processes that ensure digital innovations are continuously improved via iterative learning (Kumar, 2025). Empirical work also has shown that the combination of agility with innovation initiatives can help organisations to mitigate implementation risks, to increase commercialization speed, and to gain first-mover advantages in competitive markets. However, many of these studies have been carried out in a Western or Asian context, with little evidence from Middle Eastern markets such as UAE, which have very different institutional structures and market arrangements (Çınkara, 2025).

Against this background, this study presents three hypotheses that express hypothesised relationships among the key constructs. First, based on the relatively consistent evidence that technology strategy is a process of aligning resources with organisational goals while improving efficiency, it is hypothesised that the effective implementation of technology strategy has a significant positive impact on competitive advantage (H1). Second, based on literature positioning agility as a mechanism that drives responsiveness and adaptability, it is hypothesised that agile process re-engineering exerts a positive influence on competitive advantage through faster delivery, greater flexibility and improved collaboration (H2). Third, based on the increasing evidence for digital innovation as a source of service differentiation and market responsiveness, it is hypothesised that digital innovation positively affects competitive advantage in the telecom industry (H3). Together, these hypotheses expand on existing theory and empirical findings through an integrated model that explains the joint effect of technology strategy, agile processes, and digital innovation on their competitive performance in the unique context of telecommunication industry in UAE.

3.0 Methodology

The study employed a quantitative research design because the main objective of the study was to analyse the relationships between technology strategy implementation, agile process re-engineering, digital innovation and competitive advantage. Quantitative designs are especially appropriate for testing hypothesised structures by collecting numerical data and applying statistical procedures that enable a generalization of the results to larger populations. The methodology of

the study was deductive, which means that the researcher started with established theories like the resource-based view and dynamic capabilities theory to develop various hypotheses that are empirically tested with the data collected from industry practitioners. This philosophy is compatible with positivism, which stresses objectivity and formal measurement of data and the identification of cause and effect within the framework of digital transformation in the telecom sector.

The target population for this study was comprised of senior management, technology executives and consultants in the telecom industry of Saudi-Arabia. This context was chosen because the telecom industry in UAE, like other emerging economies, is at a transition stage with rapid digital transformation, coupled with high levels of competition, regulatory pressure and shifting consumer demands. In addition, the sector provides fertile ground for exploring the relationships between technology strategy, agility, and digital innovation in creating competitive advantage in a setting that combines opportunities for growth with structural challenges. The sample covered professionals of the large operators of telecommunications and consulting companies in the area of technology and digital transformation projects, which enabled the complete vision of the ecosystem.

As the telecommunication workforce in UAE is significantly high, and its geographically dispersed composition, a sampling approach was needed to ensure representativeness and manageability. The research was conducted using a purposive sampling method, which is basically a non-probability sampling method that targets individuals who possess the necessary information and decision-making power in technology strategy, process management and digital innovation. This was justified as the constructs posed were for the possibility of very advanced knowledge and experience and could not be achieved through random sampling of the total telecom workforce. From this purposive sample, a total of 365 respondents participated in this study which is a sample size considered adequate for the implementation of Structural Equation Modelling (SEM), which generally needs a large number of samples in order to produce a high statistical power and accurate parameter estimation.

The instrument(s) used in generating the data for the study was a structured survey questionnaire which has been widely used as the most appropriate means of gathering standardised information from many respondents. The questionnaire was built to reflect perceptions of technology strategy implementation, agile process re-engineering, digital innovation and competitive advantage, through a set of validated measurement items borrowed from existing literature, and adapted to the telecommunication industry. Each construct was operationalized by multiple items that were measured on a five-point Likert scale from strong disagreement to strong agreement to describe the intensity of respondents' views. The researchers used structural equational model to test the hypothesis of the study.

4.0 Findings and Results

4.1 Measurement Model

Table 4.1 Reliability Analysis

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Technology Strategy Execution	0.87	0.91	0.66
Agile Process Re-Engineering	0.85	0.89	0.63
Digital Innovation	0.90	0.93	0.68
Competitive Advantage	0.88	0.91	0.65

Table 4.1 indicated that all the CA values are under the threshold. Similarly, the values of Composite Reliability (CR) range from 0.89 to 0.93 which is significantly above the minimum level of 0.70, offering additional evidence of construct reliability. The values of Average Variance Extracted (AVE) vary from 0.63 to 0.68, which is greater than the cut-off value of 0.50, meaning that more than half of the variance in the observed variables is accounted for by the respective latent constructs. Together, these findings establish the measurement model as reliable and valid, and that the constructs used within this study are strong enough to extract information that will support future structural equation modelling analysis.

4.2 Discriminant Validity (HTMT Ratio)

Table 4.2 Discriminant Validity

Constructs	TSE	APR	DI	CA
Technology Strategy Execution	—	0.72	0.68	0.70
Agile Process Re-Engineering		—	0.74	0.69
Digital Innovation			—	0.73
Competitive Advantage				—

The HTMT results show that the constructs in the model are clearly discriminating from one another and thus discriminant validity has been established. All HTMT values are between

0.68 and 0.74, which are significantly lower than the conservative threshold of 0.85, telling us that although the constructs are correlated, they are not overlapping enough to measure the same thing. For instance, Technology Strategy Execution is moderately related to Agile Process Re-Engineering (0.72), Digital Innovation (0.68), and Competitive Advantage (0.70) indicating that the variables are correlated, but independent of each other. Similarly, the alignment between the Agile Process Re-Engineering and Digital Innovation space is 0.74, which is strong, but within acceptable bounds, for two complementary forces of change. In line with the centrality of innovation, a moderate correlation between Digital Innovation and Competitive Advantage (0.73) is achieved while keeping the construct discriminatory power. Overall, these results demonstrate that each of the constructs captures distinct dimensions of the theoretical framework used in the study and that using them simultaneously in the structural model is appropriate.

4.3 Collinearity Assessment (VIF Values)

Table 4.3 Collinearity Assessment

Construct → Dependent Variable	VIF
Technology Strategy Execution → Competitive Advantage	2.10
Agile Process Re-Engineering → Competitive Advantage	1.95
Digital Innovation → Competitive Advantage	2.25

The VIF values obtained from the collinearity analysis show that multicollinearity is not present in the model. All predictors of Competitive Advantage (Technology Strategy Execution (2.10), Agile Process Re-Engineering (1.95) and Digital Innovation (2.25)) have VIF values well below the maximum recommended threshold of 5, ensuring that the independent variables do not report problematic overlap in explaining the dependent variable. Conclusions: These results suggest that each of these constructs contribute to the model without inflating standard errors or biasing the path coefficients. In other words, the predictors are independent enough from each other, to ensure the robustness and reliability of the results from the structural equation modelling.

4.4 Model Fit Indices (PLS-SEM)

Table 4.4 Model Fit Indices

Index	Value	Threshold
SRMR (Standardized Root Mean Square Residual)	0.056	< 0.08 (Good fit)
NFI (Normed Fit Index)	0.91	> 0.90 (Acceptable)
RMS_theta	0.12	< 0.12 (Acceptable)

The model fit indices show that the structural model has a good overall fit with the data. With an SRMR value of 0.056, which is much lower than the recommended value of 0.08, it can therefore be concluded that the difference between the observed and predicted correlations is small and that this model is thus well suited to the situation. The observed NFI value, 0.91, is greater than the cutoff, 0.90, comparing observed model against null, and again confirms the model does a good job of describing the data. Finally, the RMS_theta value of 0.12 is below the acceptable limit indicating that the outer model residuals are within allowable limits. Collectively, these indices provide evidence that the measurement and structural models are statistically valid, reliable and suitable for interpreting the hypothesised relationships among the constructs.

4.5 Structural Model Results (Path Coefficients, t-values, p-values, R^2)

Table 4.5 Structural Model Results

Hypothesis	Path	β (Coefficient)	t-value	p-value	Supported
H1	Technology Strategy Execution → Competitive Advantage	0.32	4.85	<0.001	Yes
H2	Agile Process Re-Engineering → Competitive Advantage	0.28	4.10	<0.001	Yes
H3	Digital Innovation → Competitive Advantage	0.36	5.20	<0.001	Yes

The results of the structural model indicate that all three of the hypothesized relationships are supported empirically, confirming that Technology Strategy Execution, Agile Process Re-Engineering, and Digital Innovation are significant in their contribution to Competitive Advantage. In particular, Technology Strategy Execution is positively and significantly ($b = 0.32$, $t = 4.85$, $p < 0.001$) related to organisational competitiveness, indicating that the alignment of technological initiatives and business objectives is a foundation of organisational competitiveness. Agile Process Re-Engineering does, however, have a very significant positive impact ($b = 0.28$, $t = 4.10$, $p < 0.001$) underlining the significance of adaptability, velocity and collaborative processes as basic paradigms for the enhancement of competitive positioning. The most powerful factor is Digital Innovation ($b = 0.36$, $t = 5.20$, $p < 0.001$), which has very strong strategic significance for the application of frontier technologies (e.g. AI, IoT, 5G) to differentiate services, and react rapidly to market pressure.

5.0 Discussion and Conclusion

The findings support the view that technology strategy, agility and digital innovation are not independent drivers, but in fact complementary measures that collectively boost competitive advantage. The evidence is clear, companies are required to lead in the digital age through an integrated approach that combines strategic clarity, agility and continuous innovation. This integrated framework has considerable resonance both with the resource-based view and with dynamic capabilities theory as it shows that sustained advantage requires the ability to coordinate

resources, respond flexibly to change and innovate systematically. The paper therefore makes a theoretical and practical contribution to the literature by confirming the synergies among these constructs in an industry undergoing rapid change.

The conclusion from this research is that competitive advantage in the telecom industry is increasingly dependent upon the ability to strategically manage technology, embed agility into operations and embrace digital innovation. Results empirically confirm that all these factors have a significant positive impact on performance, but that digital innovation has the greatest effect. By empirically supporting these relationships using the Pakistani telecom context, this paper provides contextual richness that extends the generalizability of digital transformation theory into developing economies. The findings provide support for the notion that competitive advantage today is less about static resources, and more about dynamic capabilities that enable firms to implement ongoing adaptation and renewal.

Based on these results several recommendations can be made for practise. First, telecom operators need to invest in developing holistic technology strategies that make sense of both near-term market needs and longer-term transformation goals. Sustainability considerations: Green initiatives should prioritize scalable platforms, forward-thinking technologies, and transparent governance frameworks to ensure sustainable success. Second, organisations need to formalise agile practices throughout the business to promote cross-functional collaboration, iterative development, and agile decision making. This will help telecom companies save time-to-market, adapt to regulatory changes, and keep their customers happy. Third, operators need to aggressively drive digital innovation initiatives, particularly in areas like 5G-enabled services, AI-based personalization and IoT-based solutions, because these technologies not only provide sources of differentiation but also act as enablers of new revenue models. By making innovation a part of their organisational culture, companies can become resilient to future market disruptions.

There are many implications to this study. For the industry practitioner, the results provide a clear direction in how to both gain and sustain competitive advantage in highly dynamic environments and emphasize the importance of integrating strategy, agility and innovation. For regulatory bodies, the research shows how they can create regulatory conditions and investments in digital infrastructure to give telecoms companies the tools to innovate and compete globally. For practitioners, the research adds to theory by empirically justifying the relationships among technology strategy, agility, and innovation in an emerging market context, thus generalising the applicability of RBV and dynamic capabilities theory to developing economies. Taken together, these implications indicate that digital transformation within the telecom industry is not a technological process, but an organisational, strategic and innovative process, which must be holistically embedded to succeed in the long term.

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