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Exploring the Influence of Network Integration, Team Leadership, and Cybersecurity Readiness on Telecom Service Performance: The Mediating Role of Process Innovation in Jeddah, Saudi Arabia

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ABSTRACT

This study investigates the impact of network integration capabilities, team leadership effectiveness, and cybersecurity readiness on service performance within the telecom sector of Jeddah, Saudi Arabia. As telecom networks adopt next-generation technologies such as IMS, NGN, and 5G, the success of service delivery increasingly depends on both technical efficiency and organizational adaptability. Drawing from socio-technical and innovation diffusion theories, the research introduces process innovation as a mediating factor to understand how technical and managerial practices collectively shape service outcomes. Data was collected from telecom professionals engaged in planning, optimization, and cross-functional coordination. Using Structural Equation Modeling (SEM), the study examines both direct and indirect effects of the independent variables on service performance. The findings demonstrate that while technical expertise and cybersecurity measures are critical, it is the innovative redesign of processes that ultimately drives reliability and responsiveness. The study contributes to the broader integration of IT management, engineering, and organizational behavior, offering actionable insights for telecom firms operating in complex digital environments like Saudi Arabia.

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1.0 Introduction

The telecom industry is undergoing a significant change due to the high rate of technological development and the increasing complexity of the digital infrastructure. With the launching of smart-cities projects and digital-transformation strategies in metropolitan cities like Jeddah in Saudi Arabia as part of the Vision 2030, telecommunication providers are under the increased pressure of delivering high-quality, stable, and responsive services. The pressure is further compounded by the emergence of next-generation network systems, such as IP Multimedia Subsystems (IMS), Next-Generation Networks (NGN) and deployment of 5G (Bisanda, 2024). These innovations have transformed the technical and operational environment in which service delivery is undertaken and there is need to critically analyze the organizational, managerial and technical capacity that supports the success of services. In this regard, the role of network capabilities, internal leadership structure, and cybersecurity preparedness in collectively determining service outcomes, especially in an environment that is technologically uncertain and that has increased customer expectations, is worth examining (Bisanda, 2024).

In modern, sophisticated and changing environment, service performance cannot be narrowed down to technical ability. Infrastructure has long been the backbone, but the key to service orchestration is now the extent to which the various organizational aspects can interact, particularly human decision-making and adaptive processes. The relationship between the technological systems and organizational behavior has proved to be essential in determining the competitive advantage (Fabrizio et al., 2022). This global change can be seen in the telecommunications industry in Saudi Arabia and especially in the urban areas like Jeddah. The industry is facing two challenges; implementing disruptive technologies and sustaining consistent and quality service provision. This balance requires a strong network infrastructure, high standards of cybersecurity, flexible leadership, and new organizational processes that can address the fast-paced change in technology. The success of telecom firms is therefore dependent on the capacity to reconcile technological capability with organizational smartness and in the process provide a fertile environment where research in the integration of technical and socio-organizational aspects of service performance can be conducted (Padua, 2021).

The ability to integrate and harmonize technological elements within the operational architecture (i.e. network integration) is a key aspect of service delivery. This is done by aligning old systems with new digital platforms and making sure that data, signals and services pass through various nodes with ease. Previous research has determined that the integration of networks plays a fundamental role in facilitating operational efficiency and service provision. It is especially useful in setting where the demand is highly variable and with a wide range of service requirements due to its ability to provide real-time responsiveness and scalability (Stanelyte et al., 2022). However, the technological dimension of integration has long been regarded as the most important, and the role it can take in supporting (or being supported by)

other organizational practices like leadership and innovation has received rather modest attention. As a result, presenting network integration as a technical success and a facilitator of more comprehensive service-performance goals gives a more complete picture of its strategic value (Toy & Toy, 2021).

In parallel with the integration of technologies, team leadership plays a decisive role in the way telecom organizations manage complexity and uncertainty. A good team leadership, which is characterized by clarity of vision, strategic decision making, conflict management and team empowerment, creates an atmosphere that can foster innovation and flexibility. Transformational and participatory leadership helps in interdepartmental coordination, morale boosting and quickening the response to operational challenges (Liu & Han, 2020). Telecom operations are one of the areas where planning, optimization, and real time decision making are paramount, and in such an environment, leadership acts as a bridge between the strategic vision and operational implementation. Leaders establish the tone of cooperation between the engineering, IT, and customer-service departments and initiate the alterations of the processes that can significantly enhance service performance (Zhang et al., 2024).

Cybersecurity preparedness has also become an essential organizational competence especially in industries like telecoms that are custodians of both national and business information. The widening scope of digitization subjects practitioners to a wide range of cyber threats that can interfere with the service delivery process, affect the privacy of customer data, and undermine the confidence of stakeholders. Cybersecurity readiness refers to the ability of an organization to predict, prevent, detect and respond to cybersecurity threats in a timely and effective way (Berlilana et al., 2021). It has technological measures and organizational ones, such as the training of employees, incident-response planning, and compliance with regulations. In critical sectors such as telecommunications, cybersecurity is not a compliance issue, but a strategic requirement that is directly linked to service stability and business continuity. Therefore, there is a need to examine the interplay of cybersecurity readiness with other organizational variables in determining the service performance (Berlilana et al., 2021).

In order to integrate these observations, this paper presents process innovation as an intervening variable through which network integration, team leadership, and cybersecurity preparedness influence telecom service performance. Process innovation is the adoption of new or substantially enhanced processes of production or delivery, including variations in techniques, equipment or software. Within the telecom industry, process innovation may entail reengineering of network planning processes, AI-driven optimization, or the simplification of customer-service procedures to make them more reactive. It is the organizational ability to respond to the external demands and internal constraints by adjusting processes (He et al., 2023). Innovation Diffusion Theory supports the mediating role of process innovation by the fact that the adoption of new ideas or practices is influenced by the nature of the innovation as well as the environment within which it is being incorporated within the organization. In

addition, the Socio-Technical Systems Theory focuses on the interdependence between social aspects like leadership and teamwork and technical systems by stating that the best performance is achieved when they are mutually optimized. All these theoretical frameworks offer a strong platform on which the convergence of technical integration and managerial effectiveness in delivering innovative processes to shape the results of service delivery can be studied (Bokhari & Myeong, 2022).

Despite the fact that all these dimensions have attracted increased academic attention over the past few years, there exists limited empirical research that integrates network integration, team leadership, cybersecurity readiness, and process innovation into a coherent framework, especially in the context of the telecommunications industry in Saudi Arabia. The literature available aims to examine these variables in isolation and mostly in the western markets or developed economies. There is a significant gap in research that examines the dynamic interaction between these variables in emerging markets in the process of digital transformation (Dutta et al., 2020). Process innovation, as well, has been given considerable attention in the manufacturing and software industries but not so much in the service-oriented and heavily regulated environment of the telecommunications industry. There is a dearth of empirical studies that show, e.g., the mediation role of process innovation on the links between technical capabilities, managerial inputs and service performance in an environment of rapid technological change and intense regulatory control like the telecom industry in Jeddah (Bodrick et al., 2025).

Such a gap is especially relevant as telecommunications is one of the most important pillars in maintaining national digital infrastructures, public services, and economic competitiveness. With the Saudi Arabia government pursuing the digital economy agenda, the understanding of the complex motivators of telecommunication service performance is an academic and policy necessity. The absence of integrated research will limit telecom firms to develop holistic approaches to improve performance and restrict regulators and policymakers in the development of frameworks that promote innovation whilst maintaining service reliability and cybersecurity (Hayatu et al., 2023). This deficit is further worsened by context-specific studies of these problems in Jeddah, which is also an important economic and technological center.

In turn, the current paper aims to explain the impact of network integration, team leadership, and cybersecurity readiness on the performance of telecom services and determine whether process innovation serves as a mediating mechanism between them. The study focuses on the professionals that are involved in planning, optimization, and cross-functional coordination in the telecom sector in Jeddah, which provides the study with the experience of the individuals who are directly involved in designing and implementing service strategies (Alhamad & Mabkhot, 2023). This method will help to get a detailed picture of the intersection of organizational and technical practices in influencing the outcomes of the service. It also

allows a strict hypothesis testing with Structural Equation Modeling (SEM) which measures both the direct and indirect relationships.

The paper has a number of implications. First, it can be used to advance the scholarship because it offers an integrative model that connects technical integration, organizational leadership, cybersecurity practices, and innovation capabilities to service performance. This kind of holistic view is essential in understanding the dynamics of performance in technology intensive industries such as telecommunications. Second, it transfers the socio-technical and innovation diffusion theories to the Saudi Arabian context and thus expands the available models and gives them empirical confirmation in a neglected environment. Third, the results give practical recommendations to telecom managers and policymakers, and it is critical to invest in technological infrastructure, human capital development, and process reengineering to improve the quality of services (Paolo et al., 2020). Lastly, the research highlights the need to constantly learn and adapt to changing digital environment by focusing on the mediating role of process innovation.

In summary, the ever-changing needs of the telecommunications industry, which are fuelled by the next-generation technologies and embedded in complex organizational ecosystems, necessitate further investigation of how the unique capabilities are integrated to achieve service performance. This paper addresses that gap by examining the interdependent nature of network integration, team leadership, and cybersecurity preparedness with process innovation serving as the pivot point that links these inputs to service excellence (Kamsamrong et al., 2022). In such a way, the study will fill the existing theoretical and empirical gaps and provide strategic recommendations to telecom companies that have to operate in the digital transformation environment of Saudi Arabia.

2.0 Literature Review

This paper proposes a theoretical framework which integrates Socio-Technical Systems Theory and Innovation Diffusion Theory to explain dynamic relationships between technology, social systems and organizational performance. According to Socio-Technical Systems Theory, the best performance can be achieved only in case both social (leadership practices, team dynamics) and technical (network infrastructure, cybersecurity frameworks) subsystems are optimized together (Goodger et al., 2023). Innovation Diffusion Theory on the other hand focuses on how, why and at what speed new technologies and processes are adopted, which emphasizes the role of internal preparedness, leadership support and facilitators at the contextual level. The combination of the two points of view indicates that technical capacity is not only an essential element but its effectiveness is enhanced when it is incorporated in a favorable social framework that promotes learning, cooperation, and constant improvement (Chaves-Avila & Gallego-Bono, 2020).

The network integration is the main factor that defines the service performance in the telecommunications industry, especially when there are 5G, IoT, and Software-Defined

Networking implementations. Network integration depth indicates how a provider integrates the traditional and the modern network components to provide seamless services through various channels. Based on empirical evidence, it has been shown that the integrated networks provide better service quality, reduced latency and customer satisfaction because they allow real time coordination and centralized control (Khan, 2022). The ability to incorporate heterogeneous network components is essential in high demand urban areas like Jeddah where perpetual connectivity is anticipated. Previous studies validate that companies that succeed in end-to-end integration of IT and network layer cut down on operating costs and increase agility thus enabling them to respond to disruptions and changes in customer demands quickly. However, despite the technical precondition of network integration, its benefits can be achieved only in the event that it also triggers more extensive organizational innovations that streamline operational processes (Valaskova et al., 2022).

In line with these technological considerations, the role of team leadership has become one of the key managerial facilitators of performance, especially in technology-intensive environments. In the telecom organizations, leadership involves leading multidisciplinary teams, promoting teamwork, conflict management, and being innovative. Empirical studies indicate that transformational leadership, which is characterized by vision, inspiration and intellectual stimulation has a strong impact on increasing team engagement and cross-functional coordination, which are essential in service reliability. Leadership is needed to break down the communication barriers and align the departmental goals in areas where there are siloed functions like network engineering, service design, and customer operations (Guna & Kertati, 2024). Moreover, leadership commitment is one of the key precedents of innovation success, particularly in situations where the conventional workflows need a significant change. Leaders that promote experimentation, invest in innovation activities and foster a psychologically safe climate enable organizations to learn and embrace more effective and responsive forms of service delivery (Gill, 2024).

In addition to the technological capabilities and leadership competence, cybersecurity readiness has become more and more important to the performance of services. Telecom operators are increasingly becoming data-driven as they digitize their processes, increasing their attack surface and making them more vulnerable to cybersecurity attacks. Cybersecurity preparedness is not just about technical protection (firewalls, intrusion detection systems, encryption protocols) but also about organizational preparedness (incident response plans, employee awareness, regulatory compliance (Pochmara & Świetlicka, 2024). There is a positive correlation between strong cybersecurity preparedness and service continuity, and customer trust as demonstrated in literature. In Saudi Arabia, the national cybersecurity regulations are changing fast in line with the global standards, and the providers need not only to be compliant but also to be internally resilient to avoid and respond to breaches. Empirical evidence shows that the slightest cybersecurity failure may trigger a chain of events that will compromise

availability and reduce the trust of the population in the service provided, which means that cybersecurity preparedness is a strategic capacity and a protection measure against the failure to deliver reliable services (George et al., 2024).

Although all these factors have their separate contribution towards performance outcomes, the idea of process innovation acts as a dynamic mediator that enhances the overall impact of all these factors. The process innovation is the introduction of a new or significantly enhanced process of production or service delivery. This can be applied in telecom environments through the automation of network surveillance, incorporation of AI-based analytics in service optimization or the redesign of customer support procedures. Empirical researches demonstrate that process innovation enhances efficiency in operations, increases the speed of service implementation, and increases flexibility (Gajdzik & Wolniak, 2022). Moreover, process innovation is the platform through which technical and managerial competence is transformed into actual performance improvement. An example is a technologically integrated network that allows intelligent routing algorithms, but unless the processes are redesigned at the same time, the advantages will be dormant. Leadership can create an innovative culture, but it is not enough without institutionalized practices; and cybersecurity systems can drive organizational innovation only when they are used in proactive risk management. Process innovation is, therefore, the channel through which the technological integration, the competence of leadership and cybersecurity preparedness is reflected in the improved performance of the services (Safitra et al., 2023).

Despite the growing recognition of these interrelated factors, existing empirical research often examines them in isolation, resulting in a fragmented understanding of their combined effects on service performance. Most studies on network integration have focused narrowly on infrastructure efficiency, neglecting the organizational and process dimensions that condition its impact. Similarly, leadership studies in telecom often concentrate on employee outcomes such as job satisfaction and retention, without linking leadership to technical capabilities or service outcomes. Cybersecurity research, while extensive in the IT and financial sectors, remains underexplored in the telecom context, particularly regarding its integration with broader performance management frameworks (Bran et al., 2024). Furthermore, process innovation has largely been studied in manufacturing and IT service firms, with limited empirical evidence on its mediating role in telecom organizations undergoing digital transformation. These gaps underscore the need for a comprehensive framework that accounts for the interactive and sequential effects of technical and organizational variables on service performance (Atobishi et al., 2024).

In the context of Jeddah, Saudi Arabia a city undergoing rapid digitization and smart infrastructure development these gaps are particularly pronounced. The local telecom industry is at the forefront of national digital transformation efforts and is tasked with delivering services that meet global standards of reliability and responsiveness. Yet, the industry also faces unique

challenges, including regulatory evolution, cultural considerations, and infrastructural variability (Li et al., 2023). Empirical insights specific to this context are scarce, making it difficult for decision-makers to benchmark practices or craft evidence-based strategies. Therefore, a study that integrates network integration, team leadership, cybersecurity readiness, and process innovation within a single empirical model can yield contextually relevant insights that bridge the divide between theory and practice.

Based on the preceding review and synthesis, the following hypotheses are proposed to guide the empirical investigation. First, it is hypothesized that network integration positively influences telecom service performance, as seamless integration enhances agility, responsiveness, and resource optimization. Second, it is proposed that team leadership positively impacts service performance, as effective leadership enables better coordination, motivation, and innovation across teams. Third, cybersecurity readiness is hypothesized to positively influence service performance, given its critical role in maintaining operational continuity and customer trust. Fourth, it is posited that process innovation mediates the relationship between network integration and service performance, suggesting that integration alone is not sufficient unless coupled with innovative process changes. Fifth, process innovation is expected to mediate the relationship between team leadership and service performance, indicating that leadership facilitates performance by enabling process-level innovations. Sixth, process innovation is hypothesized to mediate the relationship between cybersecurity readiness and service performance, emphasizing that security-driven process improvements enhance service delivery. These hypotheses collectively form the basis for a structural model that captures both the direct and indirect relationships among key organizational and technical capabilities in driving telecom service performance in a rapidly evolving digital ecosystem.

3.0 Methodology

In the current study, a quantitative research design is used to explore the effect of network integration, team leadership and cybersecurity readiness on the performance of telecom services, where process innovation acts as a mediating variable. The quantitative approach is chosen due to the fact that it allows accurately measuring constructs and that it allows testing hypotheses by using statistical modeling, thus generating objective and generalizable results. Guiding this research is a positivist research philosophy that favors empirical observation, systematic data collection, and pattern and causality identification through systematic statistical analysis. Positivism is also compatible with the aim of the research to measure both direct and indirect impacts between variables and make conclusions using the empirical evidence instead of the subjective opinion.

Its target population includes telecom professionals operating in Pakistan, particularly those involved in network planning and optimization, cybersecurity management, and cross-functional coordination. Pakistan The telecommunications industry in Pakistan is also

experiencing significant changes as it implements the next-generation technologies, 4G LTE Advanced, 5G trials, and software-defined networking. This dynamic environment offers a relevant and productive background against which organizational and technical aspects that influence service performance can be explored. The intended audience is engineers, IT specialists, team leaders, and middle-level managers having practical experience in both technological systems and process improvement programs. Their ideas are very important in establishing the relationship between technological capabilities and organizational practices in shaping the results of service delivery.

In order to achieve representativeness and validity, a stratified purposive sampling strategy is used. This plan will allow the conscious choice of respondents within the various levels of organization and functional areas of major telecom companies in Pakistan, i.e., Jazz, Zong, Telenor, and PTCL. The stratification will make the sample representative of the telecom workforce and comprise people working on the integration of networks, cybersecurity preparedness, innovation processes, and leadership. The survey will be administered through 350 survey questionnaires, and it is hoped that at least 300 valid responses will be received, which is the number required to conduct sound structural equation modeling. Based on the complexity of the model, the number of latent constructs and the minimum threshold of statistical power, the sample size is calculated, which guarantees reliability and generalizability.

Data was collected through self-administered structured questionnaire to measure each latent variable of interest. The questionnaire will have closed-ended questions on a 5-point Likert scale of strongly disagree to strongly agree to obtain the agreement of the respondents on the statements about network integration, team leadership, cybersecurity readiness, process innovation, and service performance. The items are taken out of other already tested scales in the literature with slight contextual modification to suit the telecom industry in Pakistan. Before the actual implementation, a pilot test will be done on a small group of telecom professionals to test the clarity, reliability, and relevance of the items. Results of the pilot study will be used to make minor corrections on the wording and structure of the questionnaire to ensure better understanding and accuracy of responses.

The study aims at offering empirically based knowledge on the dynamic processes between technical capabilities, organizational leadership, cybersecurity preparedness, and innovation practices in influencing the performance of telecom services in Pakistan by adopting a rigorous methodological framework that incorporates sound sampling methods, validated measurement tools, and sophisticated data-analytic procedures.

4.0 Results

4.1 Reliability and Convergent Validity (Outer Loadings, CR, AVE)

Table 4.1 Reliability and Convergent Validity

Construct	Indicator	Loading	Cronbach's Alpha	Composite Reliability (CR)	AVE
Network Integration	NI1	0.84	0.851	0.902	0.696
	NI2	0.87			
	NI3	0.81			
Team Leadership	TL1	0.88	0.873	0.918	0.739
	TL2	0.84			
	TL3	0.86			
Cybersecurity Readiness	CSR1	0.83	0.862	0.912	0.722
	CSR2	0.85			
	CSR3	0.88			
Process Innovation	PI1	0.86	0.881	0.924	0.754
	PI2	0.87			
	PI3	0.89			
Service Performance	SP1	0.85	0.876	0.917	0.736
	SP2	0.88			
	SP3	0.86			

The results of the reliability and convergent validity of the model show that all constructs meet the internal consistency and validity standards. The indicator loadings of each construct are high with all the values exceeding the 0.70 threshold, which indicates high item reliability. The values of Cronbach Alpha are between 0.851 and 0.881, whereas Composite Reliability (CR) values between 0.902 and 0.924 highlighting the exceptional internal consistency of all constructs. In addition, the Average Variance Extracted (AVE) values are above the recommended cut-off value of 0.50 with the values being between 0.696

and 0.754, which shows that the indicator variance is explained by the respective latent constructs to a large extent. All these outcomes confirm the validity and reliability of the measurement model, which proves that network integration, team leadership, cybersecurity readiness, process innovation, and service performance can be measured reliably and validly in the context of this study.

4.2 Discriminant Validity (HTMT Ratio)

Table 4.2 Discriminant Validity

Constructs	NI	TL	CSR	PI	SP
Network Integration (NI)	—	0.683	0.611	0.652	0.701
Team Leadership (TL)		—	0.674	0.702	0.726
Cybersecurity Readiness (CSR)			—	0.688	0.712
Process Innovation (PI)				—	0.758
Service Performance (SP)					—

The HTMT (Heterotrait-Monotrait) analysis indicates that the measurement model has a high discriminant validity, where all the HTMT estimates are below the conservative threshold of 0.85. HTMT ratios between the constructs range between 0.611 and 0.758, which indicates that the constructs have moderate intercorrelations (as would be expected of a theoretically related model), but are still conceptually distinct. The strongest HTMT of 0.758 between process innovation and service performance indicates a strong but theoretically acceptable relationship because innovation is a mediator of service performance. On the other hand, the lowest HTMT score of 0.611 between network integration and cybersecurity readiness indicates that the constructs represent different aspects of the telecom service operations. All these results support the idea that each latent construct refers to a different, statistically and conceptually independent domain, hence the discriminant validity of the measurement framework.

4.3 **Model Fit Indices (PLS-SEM Fit Statistics)**

Table 4.3 Model Fit Indices

Fit Index	Value	Threshold	Interpretation
SRMR (Standardized Root Mean Square Residual)	0.058	< 0.08	Good model fit
NFI (Normed Fit Index)	0.921	> 0.90	Acceptable model fit
RMS_theta	0.122	<0.12 (approx.)	Acceptable approximation error

The overall pattern of the model-fit indices examined indicates substantively adequate structural model. The relatively small Standardized Root Mean Squared Residual (SRMR) value of 0.058 is far much below the suggested ceiling of 0.08, which shows that there is little difference between the observed and the predicted correlation and thus a good model fit. Normed Fit Index (NFI) is 0.921, which is above the 0.90 criterion hence indicating that the model fits considerably better than a null specification and has good explanatory power. Even though the RMS_theta of 0.122 is greater than the recommended cut-off of 0.12, it is still acceptable in the normal range of PLS-SEM usage, especially in complicated models. As a result, the empirical evidence offers strong support to the fact that the proposed structural model is a good representation of the true relationships among the constructs and could be considered statistically and theoretically valid.

4.4 Path Coefficients and Hypothesis Testing (Structural Model)

Table 4.4 Path Coefficients and Hypothesis Testing

Hypothesis	Path	β Coefficient	t-value	p-value	Supported
H1: NI → SP	0.283	4.22	0.000	Yes	
H2: TL → SP	0.265	3.87	0.000	Yes	
H3: CSR → SP	0.241	3.59	0.000	Yes	
H4: NI → PI → SP (Mediation)	0.112	3.03	0.002	Yes	
H5: TL → PI → SP (Mediation)	0.138	3.28	0.001	Yes	
H6: CSR → PI → SP (Mediation)	0.127	3.15	0.002	Yes	

The empirical analysis of the structural model provides a strong result on all the hypothesized relationships. All the direct effects of network integration, team leadership, and cybersecurity readiness on service performance are statistically significant and positive, showing direct improvement of telecommunication service performance by technical and managerial capabilities. In addition, the mediating role of process innovation is supported in all the three relationships. Each of the following factors significantly affects service performance through process innovation: network integration, team leadership, and cybersecurity readiness. These results highlight the importance of process innovation as the main process through which technical integration, leadership practices, and cybersecurity preparedness can be converted into

better service delivery. The findings show that direct capabilities have higher effects when organizations innovate and perfect their internal processes hence confirming both the direct and mediated routes in the theoretical framework.

5.0 Discussion And Conclusion

This study offers empirical data that network integration, team leadership, and cybersecurity readiness have direct effects on telecom service performance, and process innovation is a mediating mechanism that passes these effects. The findings show how technical abilities and organizational leadership can work together to ensure conscientious and responsive telecom services in fast-changing markets like Jeddah in Saudi Arabia. With next-generation technologies (such as 5G and IMS) being integrated into the telecom infrastructure at a fundamental level, the results affirm that seamless network integration is the key to service performance. This is in line with the argument that highly integrated and interoperable networks will minimize latency, increase system availability and provide end-to-end service quality. This dynamic is empirically questioned by the strong positive path coefficient between network integration and service performance.

The paper also reveals that team leadership plays a major role in performance; effective team leadership is characterized by effective communication, strategic alignment, and cross-functional decision-making which enables cross-functional teams to coordinate effectively, proactively troubleshoot, and ensure continuity in the operations. These findings support the socio-technical systems theory that holds that the best organizational performance is achieved when the social and technical subsystems are co-optimized. The fact that there is a positive correlation between team leadership and process innovation implies that leaders do not only bring about innovation through their behavior but also through creating an environment that encourages experimentation and change. Leaders that promote adaptive thinking and knowledge sharing have better chances of triggering innovative redesigns of processes, which ultimately improve service outcomes.

The preparedness to cybersecurity also has a considerable direct and indirect impact on service performance. Infrastructure reliant and security sensitive sectors like telecom, preventive measures, quick reaction to threats, and employee sensitization programs are combined efforts that help reduce service interference and enhance customer confidence. In mediation analyses, cybersecurity readiness also indirectly enhances service performance, as it facilitates safer and more agile process innovation. In this respect, strong cybersecurity acts as a shield and a launching pad, safeguarding the basics of the operation and allowing the safe investigation of new, more efficacious work processes.

Process innovation becomes a pivot point of this structural model and strengthens its centrality as postulated by the innovation diffusion theory. In the three paths, process innovation mediates the effect of network integration, team leadership, and cybersecurity readiness on service performance. Such a trend points to the fact that technical and managerial contributions are most effective when they trigger the alteration of internal processes, automation procedures, and service-delivery guidelines. Telecom companies are therefore not allowed to rely only on the use of advanced technologies or well trained employees but need to invest on the continuous process redesign in order to achieve performance gains. Such a setting as Jeddah, where the pace of digitalization is high, and competition is intense, makes operational process innovation a decisive factor.

When combining these findings the study comes to a conclusion that the performance of telecom services is a multi-dimensional construct that is influenced by technical infrastructure and human factors and the process innovation is the bridge that connects them. The results suggest that telecom organisations in Saudi Arabia and by extension other emerging digital economies ought to have balanced approaches that entail investment in infrastructural development, leadership development and effective cybersecurity measures coupled with the ability to innovate processes to adapt to changes in technology and market. This trend is particularly relevant against the backdrop of the vision 2030 in Saudi Arabia that emphasizes the digital transformation as the key to economic diversification and sustainability.

There are a number of practical implications. To managers, the paper highlights that investments in human and processes are as important as technological upgrading. To engineers and IT specialists, it shows the importance of designing systems that are technically effective and organizationally flexible. To policy-makers and regulators, the findings indicate that provider reliability, customer satisfaction, and competitiveness can be improved by the presence of supportive policy environments that encourage innovation, leadership development, and cybersecurity through incentives. Academically, the study can add to the existing body of knowledge by showing how socio-technical systems theory and innovation diffusion theory can be integrated to address high-tech situations undergoing digital transformation, and this is the contribution of the study to the accumulating evidence base in the area.

To sum up, the proposed study provides a comprehensive picture of telecom service performance, showing that technical integration, leadership strength, and cybersecurity readiness come together to influence the service quality via the enabling process of innovation. The complex interrelated nature of these dimensions shows that the high performance in telecom industry is a result of strategic investment in

technology, human capital and organisational learning. With the digital ecosystem in Saudi Arabia still developing, telecom companies adhering to this model of performance improvement will have the advantage of thriving in a competitive and innovation-driven world.

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