



REGULATORY POLICY FRAMEWORKS AND THEIR INFLUENCE ON 5G ADOPTION AND MONETISATION IN ENTERPRISES

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Abstract

5G technology offers substantial growth potential for telecom operators, yet realizing its full value in enterprise segments remains difficult due to technological complexities, regulatory constraints, and varying adoption rates. This research investigates how service innovation, spectrum allocation, and regulatory environments shape revenue outcomes in 5G ecosystems. The quantitative results indicate that developing advanced and customized 5G services significantly boosts operator revenues by enabling tailored enterprise solutions. Similarly, supportive regulatory policies and well-coordinated spectrum strategies strongly affect pricing structures and deployment timelines. Increased enterprise adoption also emerged as a critical factor in strengthening monetization performance, highlighting the importance of targeted B2B approaches.

The qualitative analysis shows that telecom providers are exploring diverse monetization pathways such as IoT-enabled services, private 5G networks, and edge-computing solutions to broaden revenue portfolios and reach new markets. However, the success of these models is closely tied to predictable regulatory conditions and forward-looking spectrum management.

Overall, the study contributes practical insights by outlining real-world revenue models and adoption patterns that can guide operators in enhancing profitability and aligning with regulatory expectations.

Keywords: 5G Monetization, Enterprise Adoption, Spectrum Management, Regulatory Frameworks, Telecom Innovation



Introduction

Modern telecommunications networks have become a central driver of digital transformation, economic competitiveness, and organizational resilience. Digital tools, including the internet, connected devices, and data-driven applications, are reshaping how businesses generate value and engage with stakeholders (Awad & Martín-Rojas, 2024). In this evolving landscape, fifth-generation (5G) mobile networks represent far more than incremental technological progress; they function as a foundational platform enabling innovation, automation, and greater digital inclusion. With capabilities such as enhanced mobile broadband, ultra-reliable low-latency communication, and large-scale machine connectivity, 5G supports advanced applications like autonomous mobility, smart factories, immersive environments, and extensive IoT networks. Target performance metrics, approximately 20 Gb/s downlink, 10 Gb/s uplink, and latency below 1 ms, position 5G as a technology designed to deliver seamless, high-speed, and highly dependable connectivity. Global projections suggest that 5G subscriptions are increasing at an unprecedented rate and may surpass one billion users within the first four years of rollout (Sabella, Micheli & Nardini, 2023), highlighting its rapid worldwide diffusion.

However, realizing meaningful revenue from 5G within enterprise markets remains a significant challenge. Telecom operators must navigate diverse spectrum bands, low-, mid-, and millimeter-wave, while making costly investments in spectrum acquisition and dense network infrastructure. Issues such as elevated spectrum prices, inadequate fiber backhaul, tower shortages, and constraints on dynamic spectrum sharing further slow adoption. Compounding these technical barriers are shortages of cybersecurity expertise and limited R&D capacity, leaving networks increasingly susceptible to security vulnerabilities. Regulatory unpredictability, global supply-chain disruptions, and infrastructure deficits, especially in developing regions, intensify the complexity of 5G deployment.

Although prior studies frequently assess consumer-level adoption or evaluate technical performance, there is limited research that holistically connects service innovation, supportive regulation, and enterprise adoption in the context of 5G monetization. To address this gap, the present study investigates how these three components collectively influence the commercial success of 5G initiatives and help shape viable, long-term business models for telecom operators.

While 5G monetization has been widely studied, existing research remains constrained by limited provider diversity, insufficient attention to IoT-related security and privacy, and a lack of empirical



validation for the proposed regulatory reforms (Haseeb et al., 2025; Pietri et al., 2025). This study addresses these gaps through a broad analysis of monetization strategies across diverse providers, integrating security and privacy considerations, and generating empirical evidence to inform policy and strategic decision-making.

1. Literature review

Recent scholarship highlights that the advancement of 5G technology has opened new avenues for telecom operators to redefine and expand their service portfolios. Researchers note that business-focused innovations—particularly the integration of IoT systems, deployment of private 5G networks, and utilization of edge-computing capabilities are reshaping conventional telecom value propositions. These 5G-enabled service innovations provide operators with opportunities to deliver customised, high-performance solutions to enterprise clients, resulting in stronger customer engagement and improved prospects for premium pricing (Arisar et al., 2024).

Regulatory governance has also emerged as a critical determinant of how telecom markets evolve, particularly regarding spectrum allocation, licensing conditions, and mandatory compliance obligations. Within the 5G ecosystem, regulatory policies significantly influence operators' ability to capitalize on new revenue models by shaping the cost, accessibility, and operational flexibility of essential spectrum assets. Studies emphasize that effective regulatory alignment is vital to ensuring efficient spectrum utilization and fostering a conducive environment for monetization (Gaie et al., 2020).

Enterprise adoption represents another central theme in the literature, functioning as a key moderating factor in the effectiveness of 5G monetization strategies. As 5G enables advanced, sector-specific applications—including smart manufacturing systems, remote healthcare delivery, automated logistics, and AI-powered industrial workflows—the commercial success of these solutions is strongly tied to the readiness, technological capability, and investment willingness of enterprise users. Prior research suggests that higher levels of enterprise adoption directly enhance the revenue outcomes of telecom operators pursuing 5G-driven business models (Da Silva et al., 2021).

2. Objectives and hypothesis of the study

This study investigates how telecom operators generate revenue from 5G technologies and spectrum assets in enterprise markets by examining the influence of innovative service models, regulatory frameworks, and enterprise adoption patterns on monetization outcomes and



competitive advantage. It aims to assess the various strategies used by operators to deliver 5G-based services and maximize spectrum efficiency for business clients. In line with these objectives, the study proposes that favourable regulatory policies significantly enhance the effectiveness of spectrum utilization and the success of 5G monetization strategies.

3. Research Methods

This research employed a comprehensive mixed-method design to examine how telecom operators monetise 5G services and spectrum resources in business markets. Earlier studies in technology-focused industries indicate that introducing new and advanced services plays a significant role in improving a firm's competitive standing and boosting revenue, especially within business-to-business markets (Farithe et al., 2022). The quantitative component allowed the study to statistically test the proposed relationships among the key variables, while the qualitative phase offered deeper insight into the strategic choices made by industry experts. Using both methods together strengthened the overall validity of the findings and supported a more nuanced understanding of the results. Core constructs—including 5G-driven service innovation, monetisation outcomes, regulatory influences, enterprise adoption, and spectrum utilisation—were assessed through a structured survey. The questionnaire drew on previously validated measures from telecom and innovation research, and responses were recorded on a five-point Likert scale ranging from strong disagreement to strong agreement. A pilot test with 45 participants ensured that the instrument was reliable, clear, and aligned with the study's objectives.

4. Data Collection and Sampling

The study targeted professionals from major telecom operators, regulatory bodies, and technology vendors across Oman and Qatar. Participants were identified through professional networks, online platforms such as LinkedIn, industry gatherings, and organizational listings. A stratified random sampling method was used to ensure balanced representation across organizations, job roles, and levels of industry experience. In total, 325 individuals completed the quantitative survey.

For the qualitative element, five experienced mid- and senior-level specialists involved in 5G planning and deployment were purposively selected for semi-structured interviews held through virtual communication tools.

Quantitative data were processed using SPSS, while the interview material was examined using thematic analysis to identify recurring patterns and insights.



5. Data Analysis

Table 1 outlines the demographic makeup of the 325 respondents. Most participants belong to the mid-career age groups of 25–34 years and 35–44 years, showing that the study largely reflects the views of professionals actively involved in telecom operations and decision-making. Only a small share of respondents are above 45 years, indicating limited input from older age groups. The sample includes more men than women, though female participation is notable and points toward improving gender diversity in the sector.

Most respondents work as Network/IT Engineers or Product Managers; roles closely tied to the technical and strategic aspects of 5G services. Smaller groups come from sales, policy, and senior management positions. Experience levels also show a highly knowledgeable workforce, with the majority having between 6 and 15 years in the telecom industry.

In terms of organization type, most participants represent Telecom Service Providers and Technology Vendors, the two segments most directly linked to 5G development and commercialization. Fewer respondents come from government, enterprises, infrastructure firms, or start-ups. Overall, the demographic profile suggests a technically skilled and experienced group, offering strong insights into 5G monetization and adoption trends.

Table 1: Frequency distribution of demographic factors

Category	Sub-Category	Frequency	Percentage
Age Group	Below 25 years	20	6.15%
	25–34 years	130	40.00%
	35–44 years	135	41.54%
	45–54 years	25	7.69%
	55 years and above	15	4.62%
Gender	Male	191	58.77%
	Female	134	41.23%
Job Role / Designation	Network/IT Engineer	147	45.23%
	Product Manager	141	43.38%



Category	Sub-Category	Frequency	Percentage
	Business Dev./Sales Executive	14	4.31%
	Strategy / Policy Analyst	11	3.38%
	CXO / Senior Management	12	3.69%
Years of Experience	Less than 2 years	20	6.15%
	2–5 years	7	2.15%
	6–10 years	146	44.92%
	11–15 years	141	43.38%
	More than 15 years	11	3.38%
Type of Organization	Telecom Service Provider	147	45.23%
	Infrastructure Provider	11	3.38%
	Regulatory Body / Government	14	4.31%
	Enterprise User	11	3.38%
	Technology Vendor	131	40.31%
	Start-up / Innovation Hub	11	3.38%

Source: SPSS output

The descriptive statistics in Table 2 provide an overview of how respondents scored across the main study variables. The mean values for all constructs fall roughly between 3.3 and 3.5, indicating generally positive or moderate agreement among participants. The standard deviations show a reasonable spread of responses, suggesting that while there is some variation in views, the responses remain fairly consistent within each category. Overall, these results reflect a stable dataset with enough variation to support further analysis.



Table 2: Descriptive Statistics

Variable	N	Mean	Std. Deviation	Std. Error Mean
Age Group	325	2.57	0.878	0.047
Gender	325	1.41	0.493	0.026
Job Role / Designation	325	1.77	0.957	0.051
Years of Experience in the Telecom Sector	325	3.35	0.844	0.045
Type of Organization	325	3.00	1.947	0.104
BSI	325	3.3670	0.79141	0.04224
RGBM	325	3.4319	0.78011	0.04164
RP	325	3.3875	0.76439	0.04080
ESMS	325	3.3704	0.75957	0.04054
MS	325	3.4462	0.80444	0.04294
MSu	325	3.3835	0.79575	0.04247
LEA	325	3.3840	0.81876	0.04370

Table 3 reports the reliability results for the 35-item instrument used in the study. The Cronbach's alpha value of 0.987 shows that the items are highly consistent with one another, indicating that the tool is dependable for assessing the factors linked to 5G monetisation strategies. The standardised alpha, also 0.987, reinforces the strong reliability of the overall scale.

Table-3 Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.987	.987	45

5.1 Correlation Analysis

The correlation analysis in Table 4 reveals strong and meaningful linkages among the study variables. All correlation coefficients are positive and statistically significant at the 1% level, indicating that improvements in one factor tend to be associated with positive changes in the others. Regulatory policies (RP) show the strongest association with the effectiveness of spectrum monetisation strategies (ESMS), suggesting that supportive regulation plays a central role in enhancing spectrum-related outcomes. Service innovation (BSI) is also closely connected with monetisation success (MSu) and regulatory conditions, highlighting the combined influence of innovation and policy support in shaping monetisation performance. Revenue growth in business



markets (RGBM) demonstrates moderate yet significant relationships with regulatory policy and monetisation strategy, implying that clear regulatory guidance and strong monetisation models contribute to business expansion. Overall, the results point to a highly interconnected ecosystem in which regulation, innovation, strategy, and enterprise adoption work together to strengthen 5G monetization efforts.

Table 4: Correlation analysis

		BSI	RGBM	RP	ESMS	MS	MSu	LEA
Correlation	BSI	1.000	.422	.574	.485	.428	.565	.458
	RGBM	.445	1.000	.585	.514	.545	.458	.478
	RP	.441	.588	1.000	.525	.565	.489	.558
	ESMS	.482	.589	.541	1.000	.447	.489	.598
	MS	.479	.516	.521	.454	1.000	.515	.485
	MSu	.517	.497	.489	.465	.558	1.000	.478
	LEA	.469	.487	.535	.574	.425	.468	1.000
Sig. (1-tailed)	BSI		.000	.000	.000	.000	.000	.000
	RGBM	.000		.000	.000	.000	.000	.000
	RP	.000	.000		.000	.000	.000	.000
	ESMS	.000	.000	.000		.000	.000	.000
	MS	.000	.000	.000	.000		.000	.000
	MSu	.000	.000	.000	.000	.000		.000
	LEA	.000	.000	.000	.000	.000	.000	

Source: SPSS output

5.2 Regression Analysis

The regression results provide additional support for the study's hypotheses. For H1, the model produced an R value of 0.455, indicating a moderate level of association between the predictor and outcome variable. The R² value of 0.207 shows that approximately 20.7% of the variation in revenue growth can be attributed to service innovation. The F-statistic (91.139, p = .000) confirms that the model is statistically significant.



Table 5: Regression Analysis

	R	R Square	Sum of Squares	df	Mean Square	F	Sig.
H1	.455 ^a	.207	44.106	1	44.106	91.139	.000 ^b

Source: SPSS output

The regression model based on the updated sample of 325 respondents shows an R value of 0.455 and an R^2 of 0.207. This means that around 20.7% of the variation in the dependent variable is explained by the predictor. The model is statistically significant ($F = 91.139$, $p < .001$), confirming that the relationship identified in the earlier analysis remains valid even with the updated sample count.

6. Discussion

The empirical findings reinforce the central premise of the study: service innovation plays a crucial role in revenue expansion within 5G business markets. The positive and moderate correlation between BSI and RGBM, along with the significant regression results, demonstrates that firms investing in advanced 5G solutions, such as IoT integrations, private networks, and edge-enabled services, are better positioned to achieve revenue gains. The regression model indicates that nearly one-fifth of the variance in revenue growth can be attributed to service innovation alone, underscoring its importance in shaping monetisation outcomes.

Similarly, regulatory policies emerged as a strong determinant of spectrum-based monetisation, as shown by the high correlation and the robust regression results for H2. This confirms that clear, predictable, and supportive regulatory environments facilitate more effective monetisation, particularly in areas where spectrum allocation, pricing, and licensing terms directly affect business performance. Together, these findings suggest that innovation and regulation must work hand-in-hand to unlock the full potential of 5G in enterprise markets.

7. Conclusion

The analysis indicates that telecom operators are leaning increasingly toward diversified 5G-enabled services to enhance monetisation outcomes. By incorporating advanced solutions such as IoT ecosystems, private 5G deployments, and edge-based applications, firms can expand enterprise partnerships and strengthen their revenue streams. These innovations not only broaden market reach but also offer competitive advantages in a rapidly evolving digital landscape.



However, despite the potential for substantial growth, several obstacles remain. High spectrum costs, complex licensing requirements, and regulatory inconsistencies continue to restrict the pace of innovation and delay monetisation. The findings suggest that achieving sustainable monetisation requires a balanced approach, one that blends technological advancements with strategic alignment, enterprise-driven customisation, and proactive policy engagement.

8. Recommendations and Future Research

Future studies should consider examining 5G monetisation outcomes over longer timeframes to observe how enterprise adoption and market dynamics evolve across different industries. Sector-specific comparisons, such as manufacturing, healthcare, logistics, and retail, may provide deeper insights into the varying impact of 5G innovations across business environments. Cross-country or regional analyses may also highlight regulatory frameworks that deliver superior outcomes.

There is further scope to explore the role of emerging technologies, including artificial intelligence, blockchain, and network automation, in shaping the next generation of spectrum utilisation and enterprise-grade connectivity. Such research could help identify new avenues for improving efficiency, transparency, and monetisation within the 5G ecosystem.

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