Innovation Platforms: A New Perspective to Unleash the 5G Potential for MNOs

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Abstract: The current economic situation of Mobile Network Operators (MNOs) is far from flourishing, as the entire telecommunications industry faces financial challenges. Meanwhile, the rapid development of emerging technologies, particularly 5G, presents new strategic opportunities. Unlike previous connectivity generations, 5G is not merely an enhancement but a foundational enabler for application services, especially in the enterprise sector. Beyond its intrinsic nature as a connectivity infrastructure, 5G may serve as an innovation platform to foster the development of new business models and services. This technological shift offers MNOs a unique chance to reposition themselves within the mobile telecommunications ecosystem, avoiding the risk of becoming "commodity providers", limited to selling connectivity per se. This study explores how MNOs can leverage 5G as an innovation platform to transform their business models and regain a central role in the telecommunications sector. Through a multiple-case study in the Italian market, findings show that MNOs are gradually transitioning from basic connectivity providers to platform orchestrators focused on service integration and value co-creation. The study advances current literature by framing 5G as an innovation platform and offers practical insights into platform governance and strategic repositioning.

Keywords: 5G, Business Model, MNO, Innovation Platform, Orchestrator

1. Introduction

The current landscape for Mobile Network Operators (MNOs) is far from thriving, as the entire industry faces significant economic pressures. For instance, in Italy alone, MNOs experienced a 35% decline in revenues between 2010 and 2023. At the same time, a range of emerging technologies is advancing rapidly. Among them, 5G stands out due to its transformative potential compared to previous generations of connectivity (Gooderham et al., 2022). Rather than being just another means of internet access, 5G introduces capabilities that make it a robust foundation for developing new application services, particularly in the enterprise segment. These new possibilities represent a critical opportunity for MNOs to reassert their influence in the mobile telecommunications market, following a period in which they have been increasingly perceived as mere providers of commoditized services (Cave, 2018).

In Italy, the regulatory framework adds a unique element to this dynamic, as only MNOs are authorized to obtain licenses for spectrum access. This regulatory specificity introduces an important contextual factor to be considered in the analysis. While 5G has sometimes been described as an innovation platform (Ahokangas et al., 2021), the topic has been investigated mainly from a technical perspective. This makes it worthwhile to explore platform literature more deeply, particularly its emphasis on the shift from resource control to orchestration, from internal efficiency to external collaboration, and from product value to ecosystem value (Van Alstyne et al., 2016). In this light, 5G's modular architecture, use of open-source tools, and support for APIs position it as a potential enabler of decentralized innovation. However, this openness also requires MNOs to redefine their role. The study addresses the following research question: "How can MNOs resume a relevant role in the mobile telecommunication ecosystem through the usage of 5G intended as an innovation platform?".

The research is carried out through an exploratory multiple-case study focusing on key actors in Italy's 5G industry (Eisenhardt, 1989). The data analysis follows the Gioia methodology (Gioia, 2013). The findings reveal that 5G can be framed as an innovation platform rather than mere connectivity, enabling critical services and modular, scalable applications (Gawer, 2021; Singh & Kapoor, 2024). However, its full potential remains constrained by market immaturity, delayed infrastructure upgrades, and limited monetization opportunities (Cave, 2018; Gooderham et al., 2022). MNOs are repositioning themselves as platform orchestrators, seeking to coordinate resources and deliver end-to-end solutions (Cennamo, 2018; Jacobides et al., 2024). Therefore, the study sheds light on the evolving role of MNOs as potential ecosystem orchestrators, without claiming to offer final conclusions given the ongoing nature of the transformation under study. It also outlines practical

recommendations: MNOs should strive to position themselves as platform orchestrators by embracing partnerships and open innovation. Their long-term success will depend on effective branding, ecosystem governance, and internal structural changes.

2. Literature Review

2.1 MNO Challenges With 5G Technology

The development of the mobile telecommunications industry and the evolving role of Mobile Network Operators (MNOs) can be divided into three distinct phases (Gooderham et al., 2022). The first phase, spanning from 1990 to 2010 and marked by the 2G and 3G eras, saw MNOs occupying a dominant position in the market (Ghezzi et al., 2015). As the sole providers of voice and SMS services, they were able to achieve high profitability. However, by the early 2000s, rising competition among operators led to intense price wars, which severely eroded their profit margins. At the same time, the industry landscape began to shift, with new prospects arising in web-based, media, and ICT services. This transition introduced significant disruption and altered the market equilibrium (Ghezzi, 2013).

The second phase, associated with the rise of 4G and taking place between 2010 and 2020, reflects a period of decline for MNOs. During this time, they failed to respond effectively to shifts in the external environment, neglecting to expand into the multimedia content space (Lehr et al., 2021) and continuing to focus exclusively on connectivity. In contrast, other actors such as Over The Top (OTT) players recognized and capitalized on the new market opportunities (Cave, 2018), further diminishing the strategic relevance of MNOs (Gooderham et al., 2022).

The third and current phase began in 2021 with the arrival of 5G technology. This latest generation of connectivity brings significant potential, particularly in the B2B domain, to reshape MNOs' business models and help them regain competitiveness following their inability to fully exploit the 4G era (Lehr et al., 2021).

5G technology represents a sophisticated and high-potential technological advancement with the capacity to support a wide array of applications (5G PPP, 2016; Cave, 2018; Ahokangas et al., 2021). From an academic perspective, 5G is frequently conceptualized as an enabling technology (Teece, 2018; Rathje and Katila, 2021; Gambardella et al., 2021). However, it has not yet achieved the status of a General-Purpose Technology (Bresnahan and Trajtenberg, 1995), primarily due to its limited diffusion and economic pervasiveness. According to Bauer and Bohlin (2022), and based on current use cases, 5G appears to be primarily oriented toward enterprise and industrial markets, rather than the mass consumer segment traditionally served by MNOs.

2.2 Innovation Platform

Platform-based businesses have transformed numerous industries, and the literature identifies five main types of platforms. These include internal platforms, which consist of tools and resources that support a modular approach to developing related products (Gawer & Cusumano, 2014); supply chain platforms, which serve to streamline resource coordination and improve operational efficiency (Gawer, 2014); multi-sided platforms, which act as intermediaries connecting distinct user groups and benefiting from network externalities (Trabucchi & Buganza, 2021); innovation platforms, which provide a foundation for third-party developers to build complementary technologies or services using standardized modular components that help foster an ecosystem (Gawer, 2021); and hybrid platforms, which aim to leverage synergies by combining different platform features (Jacobides et al., 2024).

Platforms derive their value primarily from network effects, meaning their attractiveness grows as more users join, enhancing both scale and efficiency. Their digital nature further allows them to expand and adapt quickly, while ensuring that value capture remains centralized (Gawer, 2021). Transaction platforms, in particular, reduce barriers to exchange by directly linking users (Jacobides et al., 2024), thereby minimizing market inefficiencies (Bonina et al., 2021). Innovation platforms, meanwhile, promote external innovation by enabling collaboration among a wide array of stakeholders (Gawer & Cusumano, 2014), who often rely on one another in a mutually interdependent relationship (Rietveld et al., 2019).

In innovation platforms, the final offering results from the contributions of multiple actors, with external developers adding essential complementary components. The role of the orchestrator is to ensure that value is distributed fairly among participants in proportion to their contributions (Jacobides et al., 2024).

Scholars have outlined the diverse roles that actors play within platform ecosystems. On innovation platforms, end users represent the recipients of the final offering (Gawer, 2014), while complementors or developers play a vital part in enhancing the platform by producing add-on products or services (Cennamo, 2018). Platform owners hold a central governance role, responsible for overseeing platform operations and steering strategic decisions to ensure its success.

Effective platform governance involves managing four key areas. First, defining the scope of the firm, or which elements should be developed internally (Gawer & Cusumano, 2014). Second, managing the technological architecture, striking a balance between openness and control to draw in innovators while preserving the platform's stability and quality (Jacobides et al., 2024). Third, making informed decisions about when to open the platform to external contributors, depending on their readiness and the platform's maturity (Parker & Van Alstyne, 2018). Fourth, nurturing relationships with complementors and establishing governance rules that shape the contributions of external developers (Singh & Kapoor, 2024). Lastly, it is essential to design internal structures and processes that support the resolution of critical issues (Gawer & Cusumano, 2014).

3. Objective and Methodology

Although platforms have disrupted multiple industries, the literature distinguishes different typologies, including multi-sided platforms, supply chain platforms, and innovation platforms. Innovation platforms, in particular, enable third-party developers to create complementary products and services by leveraging modular technological standards. Therefore, beyond its intrinsic nature as a connectivity infrastructure, 5G may serve as an innovation platform to foster the development of new business models and services.

Thus, this study investigates how MNOs can leverage 5G as an innovation platform to regain a central role in the telecommunications industry, addressing the following research question: How can MNOs resume a relevant role in the mobile telecommunication ecosystem through the usage of 5G intended as an innovation platform?

To investigate the dynamics at the core of this study, a qualitative approach was considered the most suitable (Eisenhardt, 1989). Given the difficulty of formulating testable hypotheses in advance and the likelihood that theoretical insights would emerge from empirical evidence, the research followed an exploratory case study methodology (Yin, 1984). This approach is particularly relevant because the research not only addresses existing gaps in the literature but also provides valuable guidance for MNOs currently undergoing a transformation. These organizations must be aware of both the limitations they face and the opportunities available to them. The focus of the analysis is the transformation process of MNOs in the 5G era, making it the central unit of investigation. The study is specifically contextualized within the Italian market, where the regulatory framework restricts spectrum access exclusively to MNOs.

For this reason, the sampling included all three Italian MNOs (MNO A, MNO B, MNO C), along with a mobile virtual network operator (MVNO A) that is particularly active in the enterprise segment. In addition, to capture a broader range of perspectives on the transition process, we decided to include additional stakeholders in order to observe the ongoing transformations of MNOs from alternative perspectives. We therefore included three system integrators (SI A, SI B, SI C), and one real-world end user that adopted 5G (Use Case A).

Data were gathered primarily through semi-structured interviews, chosen for their flexibility in allowing participants to share rich, detailed information (Yin, 1984). A total of 11 interviews conducted across the 8 case subjects served as the main data source, directly addressing the research question.

To enhance the robustness of the analysis, the sample was supplemented with additional materials: 1 podcast, 7 YouTube videos, 5 news articles, 11 industry reports, and 3 corporate websites. These secondary sources were used to triangulate the interview data, thereby improving the study's reliability and verifying whether additional relevant insights had been overlooked. A within-case analysis was carried out to gain familiarity with the data, followed by a cross-case comparison to synthesize patterns across the sample. Subsequently, quotes were grouped into first-order codes, second-order themes, and overarching dimensions. The combined use of informant-based categories (1st order) and academically grounded themes (2nd order) enabled a rigorous, qualitative representation of the connections between the data and the research question (Gioia et al., 2013).

4. Findings

The coding process brought to light several themes that emerged from the data, which were organized into three dimensions: the concept of 5G as an innovation platform, 5G market friction and resource orchestration.

4.1 5G as an Innovation Platform

Interviewees unanimously emphasized that 5G extends far beyond basic connectivity, describing it as a "*horizontal enabler with edge data centres*" (MVNO A) that forms the foundation to "*support a wide range of applications*," deliver "*innovative solutions*," and enable "*business-critical services*" (MNO C), a view also reinforced by Use Case A. Despite these expectations, the full realization of 5G's potential is hindered by delays in technological development (MNO A; SI A) and a market that remains unprepared to adopt 5G-based solutions.

Insights from the international Use Case A, based outside of Italy, highlight that 5G spectrum liberalization has accelerated development by enabling private entities to conduct low-cost and flexible testing. Technologically, 5G is designed as a modular, layered architecture composed of standardized elements that offer both flexibility and scalability (MNO A), allowing providers "*to respond in a multidimensional way to multidimensional service needs*" (MNO C). According to Use Case A, "*there will be basic components that might fit all*," suggesting that standard building blocks can improve solution replicability. In fact, the "whitebox" hardware employed is open-source and programmable, thanks to the use of Application Programming Interfaces (APIs). These APIs operate under an open development model, enhancing accessibility and facilitating innovation by enabling third parties to independently contribute.

However, the openness of these interfaces can also introduce vulnerabilities, potentially compromising the quality and security of network solutions. For this reason, MNOs place particular emphasis on carefully selecting trustworthy and reliable partners. Therefore, collaboration and interoperability are essential (SI A), with strategic partnerships playing a critical role in delivering comprehensive and cutting-edge solutions. Nevertheless, such collaboration is not without its challenges, especially in terms of communication barriers between different stakeholders (SI C).

4.2 5G Market Friction

The data reveal that connectivity is widely perceived as a commodity, making it difficult to monetize 5G services in the consumer market. This segment typically yields minimal margins: "*no one is willing to pay a significant price*" (SI C). According to SI C, "*the operator has fundamentally lost its positioning*," largely due to the rise of OTT players and the introduction of the iPhone, both of which leveraged MNOs merely as passive conduits for their services without compensating them for the use of the network (MNO A).

Even though they are trying to specialize in various verticals, as also evidenced by secondary sources and the offerings on their websites, another key issue for MNOs lies in their limited ability to effectively communicate the true value of 5G to enterprise companies, who remain hesitant to support the investment in the absence of clear, practical use cases. This underscores the importance of delivering real-world applications to "*help these companies understand what they can do with 5G*" (MNO C).

The data reveal that connectivity is broadly perceived as a commodity, making it difficult for MNOs to extract value from 5G services in the consumer market, which typically generates low margins: "*no one is willing to pay a significant price*" (SI C).

Also, in 5G enterprise market, on the supply side, MNOs struggle to effectively articulate the concrete value that 5G can deliver, especially in terms of innovative applications and industry-specific use cases. Despite the technological capabilities of 5G, these remain abstract and intangible to enterprise customers, who find it difficult to justify investment without a clear and immediate return. On the demand side, companies express a general reluctance to adopt 5G solutions due to uncertainty regarding its practical benefits, integration costs, and operational relevance. As MNO C notes, this hesitation underscores the urgent need for tangible examples that "*help these companies understand what they can do with these platforms*."

This mutual disconnect creates a market friction, where the technological offer advances faster than its business comprehension and perceived utility

As a result, MNOs find themselves in a "*moment of great redefinition*" (SI B), attempting to reposition themselves as integrators or coordinators across various roles (MNO B). Their goal is to deliver "*end-to-end service management*" overseeing the entire process "*from requirements to implementation*" (MNO C).

4.3 Resource Orchestration

Through this orchestration of resources, MNOs aim to establish themselves as central players in 5G deployment (MNO A), offering the most complete and integrated solutions (MNO C). However, they often lack the domain-specific expertise required to meet the needs of individual vertical industries (SI A), resulting in "*knowledge gaps in their understanding of use cases*" (Use Case A). To address this, MNOs are not only relying on specialized partners but are also internally reorganizing around industry verticals and investing in upskilling programs to build dedicated capabilities.

This transformation is enabling a shift toward a more consultative role (MNO A), strengthening pre-sales competencies and enhancing the ability to articulate the strategic value of 5G for specific sectors. MNOs are building "*transverse process competencies*" and creating dedicated professional roles capable of assessing end-to-end 5G solutions and guiding customers through their complexity.

The development of 5G offerings is thus increasingly market-driven (MNO B), and MNOs are positioning themselves as unique touchpoints within the ecosystem, able to mediate between industry needs and partner capabilities. This role requires not only coordination skills but also a degree of influence over partner orchestration, which reinforces their strategic position.

5. Discussion

Empirical evidence highlights the increasing effort by Italian MNOs to assume the role of platform orchestrators (Cennamo, 2018; Jacobides et al., 2024). This role goes beyond technical coordination of the platform: MNOs must also govern relationships between technical complementors and clients, managing an interdependent web of interactions that is crucial for value creation (Rietveld et al., 2019). In markets like Italy, where MNOs own a critical asset such as 5G spectrum licences, the risk of being perceived as mere connectivity providers is high. However, literature warns that such a positioning risks commoditization and loss of strategic advantage (Cave, 2018, Gooderham et al., 2022). Instead, MNOs should evolve their competencies to encompass ecosystem governance, orchestrating rather than owning the key components of value generation. For instance, MNOs can become the unique touchpoint with the end customer, managing the complexity arising from the presence of multiple actors involved in delivering the offering and implementing 5G use cases within the client company. There are currently some collaborations aiming in this direction

This shift aligns with broader platform strategy literature, which emphasizes the move from resource control to resource orchestration, from internal optimization to external interaction, and from product value to ecosystem value (Van Alstyne et al., 2016; Parker & Van Alstyne, 2018). In the 5G context, this includes making critical decisions around platform openness, such as exposing APIs to enable external innovation and decentralize development. Indeed, the use of shared APIs (Bonina et al., 2021) and open-source software incentivize the development of innovative features and functionalities attracting different entities in the creation of components. So, it has the positive effect given by the increment of accessibility (Gawer & Cusumano, 2014) and external collaboration, but on the other side there is the higher vulnerability of an open network. 5G's architectural features, standardized hardware, open-source tools, and modularity, align well with innovation platform logics, but require MNOs to strike a governance balance: enabling access for external developers while ensuring performance and security standards are upheld (Gawer, 2021; Singh & Kapoor, 2024). Literature on platform governance stresses that this equilibrium is essential to maintain network health and to avoid value-destroying behaviors (Van Alstyne & Parker, 2017).

Such openness fosters engagement and variety, as theorized for innovation platforms (Cusumano et al., 2019), and contrasts with past "*walled garden*" models, such as those seen during the 3G era, where MNOs sought to control the entire service stack (Ghezzi et al., 2015). That approach failed to deter the rise of Over-The-Top (OTT) actors who capitalized on openness and scale (Lehr et al., 2021; Gooderham et al., 2022). Therefore, defining a clear orchestration strategy early in the 5G evolution may be critical to restoring competitive positioning.

Moreover, MNOs' investment in vertical expertise and internal organizational structures reflects the dual governance challenge discussed by Gawer and Cusumano (2014): the need to coordinate internal processes while setting fair rules for external contributors.

Here below Figure 1 represents the main findings.

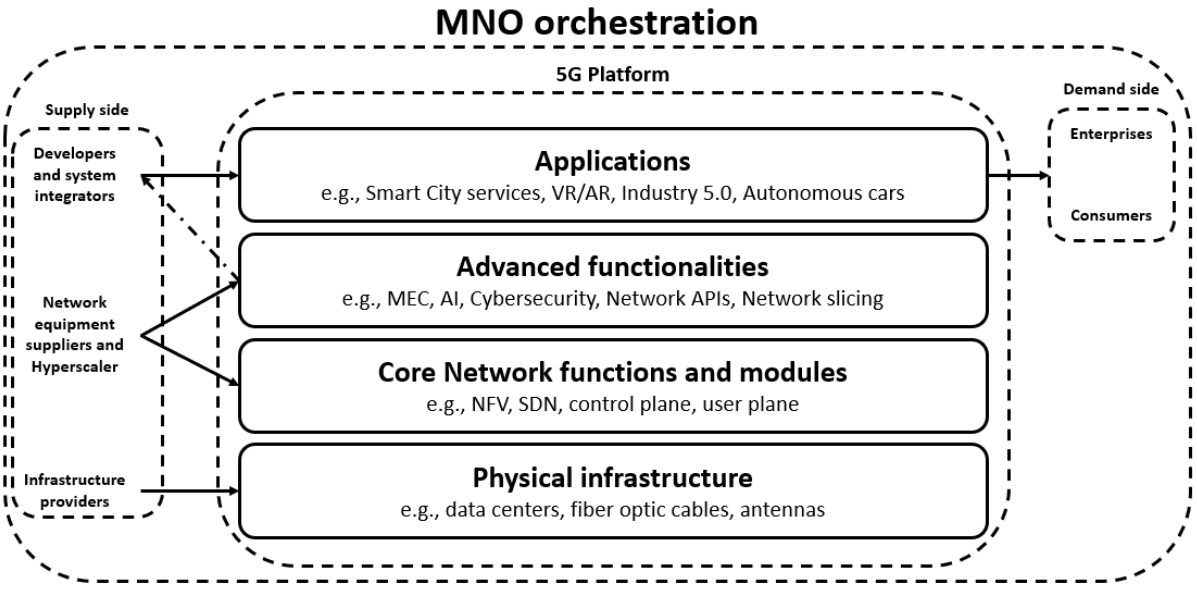

Figure 1: 5G as a Platform framework

As shown in Figure 1, the 5G Platform framework is composed of 4 main elements: the technological platform, the supply side, the demand side, and the platform orchestrator. The technological platform is composed of 4 layers, from the physical infrastructure to the applications used by companies, passing through core network and advanced functionalities and modules. Many actors, from the supply side, contribute to enrich the platform and add functionalities or assets needed to continuously evolve. In particular, infrastructure providers contribute with physical infrastructure, which is the first layer on which adding functionalities. Then, network equipment suppliers and Hyperscalers contribute to the platform enrichment with core network and advanced functionalities and modules, which allow developers and system integrators to take the latter and developing new applications for the demand side. This side is composed of both enterprises and consumers. In this platform ecosystem (Jacobides et al., 2024) is required the presence of an orchestrator to govern and manage the multiple set of relationships. MNOs, thanks to their capabilities and expertise in this industry, can assume this role of orchestrator, to move from a logic of general commodity supplier to the logic of a unique touchpoint to access to the 5G Platform functionalities, to develop applications, and to buy these applications. By doing so, the MNO can act as a catalyst in addressing market frictions and connecting demand and supply side (technology provider side). The focus shifts from resource ownership to resource orchestration, and the dashed line refers to this central role of the MNO in enabling a better alignment between demand and supply, with 5G functioning as an innovation platform.

5.1 Theoretical Contributions

In some papers in the managerial domain dealing with 5G, the concept of 5G has already been associated with the broader notions of platforms (Henríquez et al., 2022; Ahokangas et al., 2021). However, such perspectives have primarily been used to map the actors involved (Bauer & Bohlin, 2022; Teece, 2021), and the boundary conditions of these studies are often quite context-specific and restrictive. From these contributions, the challenge related to identifying the role of an “orchestrator” (Bauer & Bohlin, 2022) or a “central player” (Ahokangas et al., 2021) has emerged. In other words, the importance of having a stakeholder able to coordinate across all layers of the system has been emphasized.

This study represents an early attempt to conceptualize 5G as an innovation platform, contributing to the limited body of work that frames 5G not only as a technological infrastructure. Indeed, by applying this theoretical lens, the analysis reveals some of the structural and organizational challenges that MNOs face, while offering a novel interpretation of 5G’s potential that goes beyond purely technological aspects. Within this framework, the idea of MNOs as central orchestrators emerges as a plausible, though not predetermined, scenario, rooted in both the empirical evidence and the conceptual foundations of platform theory. However, given the evolving nature of the technology, the study does not propose definitive conclusions; instead, it outlines a trajectory concerning MNOs’ business models during the ongoing technological transition (Tongur & Engwall, 2014).

5.2 Practical Contributions

The study presents also some practical contributions. First, MNOs must become aware of their current market perception, which often reduces them to commodity providers (Cave, 2018). In this view, basic connectivity is no longer a differentiator but a baseline expectation. To gain a competitive edge, MNOs need to develop and deliver value-added services built on top of their infrastructure.

The current moment presents MNOs with a strategic opportunity similar to the one they missed during the transition from 3G to 4G, when they failed to capitalize on the value shift driven by media and content platforms (Ghezzi, 2013; Lehr et al., 2021). Given their structural limitations and lack of domain-specific expertise (Gooderham et al., 2022), MNOs should not aim to internalize all innovation but rather focus on building capabilities to coordinate external contributors and govern the platform.

Still, achieving this orchestrator role is no easy task. MNOs must navigate intense competition and overcome entrenched market perceptions that limit their strategic repositioning. Therefore, they must proactively lead this transformation, leveraging internal restructuring, strategic partnerships, and ecosystem engagement to reinforce their legitimacy and relevance in the emerging 5G landscape.

6. Conclusion

This study investigated how Mobile Network Operators can leverage 5G through the lens of innovation platforms to regain a strategic role within the mobile telecommunications industry. Using a qualitative multiple-case approach involving eight exploratory cases, the research identified three key theoretical dimensions: 5G as an innovation platform, 5G market frictions and resource orchestration. The resulting framework connects the characteristics of 5G and its ecosystem with platform-based logics, offering fresh insights into MNOs' potential orchestration roles without asserting deterministic outcomes. Despite these contributions, the research is limited by its qualitative nature, a small and sensitive data set, and the rapidly evolving context of 5G. Future research could address these limitations through comparative or longitudinal studies to capture long-term impacts on MNO repositioning.

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