



# The Digital Challenge for Multinational Mobile Network Operators. More marginalization or rejuvenation?

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## ARTICLE INFO

### Keywords:

Multinational mobile network operators  
Recombinant firm-specific advantages  
5G network  
B2B digital services  
Internet of Things

## ABSTRACT

Multinational mobile network operators (MNOs) rapidly emerged in the early 1990s and for a decade and a half were the dominant actors in their industry. We analyze the development and competitiveness of a typical MNO, Telenor. With the introduction of 4G in 2010, we show that Telenor, like other MNOs largely failed to respond to the opportunity that connectivity provided to develop digital services. Instead, these were developed by technology platform companies such as Amazon, Google and Microsoft. Telenor became a marginalized supplier of standardized internet connectivity. We argue that the ‘decade of lost opportunity’ (2010–2020) for Telenor was a product of a lack of ‘recombinant firm-specific advantages’ (FSARs). With the launch of 5G, an emerging global digital infrastructure, this sidelining is set to intensify unless Telenor responds to this new opportunity by developing B2B digital services. We analyze the FSARs that are necessary for a successful transition of capturing the value that 5G provides and the degree to which they are present, or potentially present, in Telenor.

## 1. Introduction

The interplay between firm specific advantages (FSAs), underlying industry technologies and local market conditions are critical factors when considering any process of internationalization (Dunning and Lundan, 2008; Tallman and Fladmoe-Lindquist, 2002). In few industries is the interaction between these factors as rich and shifting as in the telecommunications industry as the core industry technology, fixed-line telephony, was largely displaced by wireless mobile technology. In turn, this novel technology passed through a series of distinctive and radical iterations from 1G to 4G, and now to 5G.

In this paper we argue that the development of multinational mobile network operators (MNOs) can be usefully divided into three technologically conditioned phases. The first phase, 1990–2010, we refer to as “the rise of the MNOs” and spanned 2G and 3G wireless technologies. Industry boundaries were clear-cut, and, given their FSAs, the MNOs dominated their industry throughout this phase. Internationalization involved exploitation of these FSAs across geographies in a “replication” strategy (Winter and Szulanski, 2001)

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<https://doi.org/10.1016/j.intman.2022.100946>

Received 29 January 2021; Received in revised form 7 March 2022; Accepted 8 March 2022

Available online 15 March 2022

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resulting in locally adapted multi-domestic operations dependent on the parent company capabilities. Voice and messaging were the primary sources of income.

With the advent of 4G in 2010 (the second phase) and the adoption of smart phones, internet connectivity rather than voice and messaging became the critical source of income for MNOs. That is, “MNOs transformed from telecommunication service-providers into broadband platform providers” (Lehr et al., 2021:5). The decline in revenues on voice and messaging was initially more than offset by revenues from mobile broadband with internet connectivity. In emerging economies, that had never had fixed-line internet connectivity, with mobile broadband they leap-frogged the fixed-line to internet connectivity phase common to developed economies. Thus, internet connectivity over mobile broadband provided the opportunity to develop and offer a range of digital services not just in developed but also in emerging economies.

However, MNOs largely failed to develop their portfolio of FSAs that were necessary to capitalize on the opportunity to use mobile internet connectivity to become providers of digital services. The consequence was that the industry MNOs had dominated now contained a significant competitor in the shape of global digital service providers such as Amazon, Google and Microsoft that rapidly expanded their business from exploiting fixed-line internet connectivity to offering their services over mobile broadband internet connectivity (Dasi et al., 2019). We label this second MNO phase, 2010–2020, as “the decade of lost opportunity.”

As 5G is rolled-out from 2021 (the third phase), like Lehr et al. (2021:1) we argue that MNOs are now entering a new phase of disruption to its “competitive landscape” that will determine whether they are reborn as providers of novel B2B digital services

**Table 1**

Telenor across the three industry eras: experiences, necessary FSAs and FSARs, location requirements and mode of internationalization in the three phases.

	Dominant technology		
	2G/3G	4G	5G
Three distinct phases (years)	1990-2010 <i>The rise of the MNOs</i>	2010-2020 <i>The decade of lost opportunity</i>	2021 → <i>The rebirth of MNOs?</i>
Summary of Telenor’s strategic positioning	In line with other MNOs, Telenor was successful in renewing and refining an established business model to delivering voice, messaging, and elementary connectivity across its geographies.	In line with most other MNOs, Telenor formulated a DSP strategy and employed an ambidextrous solution to developing digital services (Telenor Digital). The effort at recombinant driven import of digital capabilities failed due to incompatible business models for connectivity and digital services. Telenor abandoned its DSP strategy and closed down Telenor Digital in favor of upgrading its connectivity provider role and a digitalization of its operational processes.	Like other MNOs, Telenor’s primary 5G strategy for revenue growth is B2B to sell 5G enabled services to enterprises and governments. Drawing on and re-combining in-house capabilities, Telenor is developing relevant FSAs such as IoT and edge computing services, connectivity security and system integration. Telenor is also recombining its capabilities with those of external industry partners and client enterprises to co-create new 5G enabled digital solutions.
Main firm FSAs/FSARs required for competitive positioning	<ul style="list-style-type: none"> <li>- Construct network infrastructure (hardware)</li> <li>- Customer acquisitions and marketing expertise</li> <li>- Replication of network and marketing capabilities across geographies</li> </ul> <p>Telenor developed these FSAs in-house</p>	<p>Required FSAs to capture value from digital services</p> <ul style="list-style-type: none"> <li>- Software platforms</li> <li>- Ability to market and distribute digital services.</li> </ul> <p>Telenor lacked the FSARs to recombine the capabilities it acquired externally to develop required FSAs. Telenor outsourced its network operations, and a range of other operations including customer call-centers and used external marketing agencies. Telenor thereby reduced their FSAs in-house activity.</p>	<ul style="list-style-type: none"> <li>- 5G enabled network with edge computing and provision of API to utilize 5G features</li> <li>- Developer portal to expose APIs to partners</li> <li>- IoT and AI</li> <li>- Advisory and system integration FSAs</li> </ul> <p>Some degree of local insidership in order to respond to local regulatory requirements. Uncertainty as to whether it has the FSARs to standardize and scale such FSAs across country operations.</p>
Location requirements	<ul style="list-style-type: none"> <li>- Local presence needed for legitimacy, distribution and operation of national network</li> </ul>	<ul style="list-style-type: none"> <li>- Local presence needed to achieve operating licenses.</li> <li>- Standardized connectivity provision leads to more emphasis on global scale and consolidation of value chain.</li> </ul>	<ul style="list-style-type: none"> <li>- Utilizing local presence and local brands to apply global tools that adapt solutions to local client needs</li> <li>- Co-create solutions with customers and partners.</li> </ul>
Dominant mode of internationalization	<ul style="list-style-type: none"> <li>- Multi-domestic with strong local presence and adaptation</li> </ul>	<ul style="list-style-type: none"> <li>- Some shift from multi-domestic to global integration</li> </ul>	<ul style="list-style-type: none"> <li>- In order to combine global tools and value chains with local adaptation and operations, a need for a transnational approach</li> </ul>

utilizing the new features offered by 5G and IoT, or whether they will continue their slide into becoming marginalized “best effort” connectivity utilities.

In this paper we map the development of MNOs from 1990 to 2020 divided into two distinct phases from 2G/3G (1990–2010) to 4G (2010–2020), and not least in terms of their FSAs. We argue that the decade of lost opportunity during 2010–2020 was a product of a lack of ‘recombinant firm-specific advantages’ (FSARs) (Lee et al., 2021:2). We then specify the FSAs MNOs will need in order to meet the 5G era if their further sidelining is to be avoided. In particular, we draw on insights from the Nordic MNO, Telenor that currently has nine MNO country operations across the main Nordic economies and Southeast Asia including Bangladesh, Myanmar and Pakistan.

Table 1 focuses specifically on Telenor. The table provides an overview of its basic strategy, its FSAs, the scope and nature of its international operations and the strengths/weaknesses of its strategy in the 2G/3G and 4G eras. For the 5G era, we include the FSARs company and industry sources view as necessary for a successful transition and the degree to which they are present, or potentially present, in Telenor. As Telenor is a rather prototypical MNO, the contents of the table have broad application to MNOs in general. We now consider the concepts of FSAs and FSARs.

## 2. Firm-specific advantages (FSAs)

As Adarkwah and Malonaes (2020:1) indicate, “A key tenet of IB theory is that to become an MNE [multinational enterprise] and survive overseas against indigenous competitors; firms must possess significant FSAs over their competitors that can help them offset disadvantages when competing abroad.” Rugman and Verbeke (2001) distinguish location bound and non-location bound FSAs. Whereas location-bound FSAs provide benefits only to a specific national market, non-location-bound FSAs can be exploited across national borders and can be used effectively either for strategies that require local responsiveness or for strategies that can lead to efficiencies in terms of economies of scale and/or scope (Rudy et al., 2016). We argue that in their early phase, MNOs had non-location bound FSAs that enabled them to successfully pursue multi-domestic internationalization characterized by exporting and adapting their business models to a variety of new settings (Bartlett and Ghoshal, 1989).

However, as Lee et al. (2021:3) argue, the value of FSAs as a rent-generating mechanism diminishes over time particularly in the context of “rapidly changing environments.” Therefore, firms are motivated to continually balance and upgrade their asset portfolio. Lee et al. (2021:2) further argue, “that (successful) asset recombination requires a certain set of firm-level capabilities, which we call ‘recombinant firm-specific advantage’ (FSAR), to create new value by recombining complementary assets available from both inside and outside the firm”. They view FSARs as “as a crucial subset of dynamic capabilities” (p.2) that allow MNEs to implement asset recombination that leads to asset augmentation. They distinguish intra-firm recombination that involves reconfiguring extant FSAs and forms of recombination that involve acquiring new FSAs beyond the firm boundary. The former is important for MNEs with knowledge-rich subsidiaries that make their knowledge available to the parent company. In the case of MNOs, their “replication” strategy meant that subsidiaries have had little to offer in terms of knowledge assets. In practice, this meant that as the MNOs entered the 4G era in 2010 in order to upgrade or change their asset portfolios to become digital services providers (DSPs), MNOs were dependent on being able to exploit external sources in order to upgrade or develop their portfolio of assets. As we discuss, in the decade of lost opportunity, MNOs such as Telenor lacked the FSARs to succeed in their ambition of becoming a DSP. As they enter the 5G-era the question is not only whether they can acquire the FSAs necessary to rejuvenate their business models, but whether they have the FSARs to achieve locally sensitive global scalability.

## 3. The evolving MNO industry

### 3.1. 1990–2010 – the emergence and rise of the MNOs

The emergence of the MNOs as global providers of mobile telephony in the 1990s was quite abrupt. Indeed, towards the end of 1990s, Sarkar et al. (1999:386) observed that “the rapid internationalization of telecommunication carriers” during the 1990s stands “in stark contrast to the slow, and gradual process suggested by internationalization theory.” Although both AT&T and Telefónica had expanded their fixed-line telephony operations overseas in the late 1980s, Sarkar, et al. (1999: 370), view 1990 as “the beginning of the era of active expansion by telcos.” Drawing on Serrano et al. (1991), Sarkar et al. (1999: 362) observe rapid and “intense foreign investment activity” involving ventures spread across 60 countries. Referring to Bauer (1994), Sarkar et al. (1999) discern “a profound global reorganization of the telecommunications industry that had been characterized by national firms operating as regulated monopolies.” However, our view is that 1991 and the first commercial launching of second-generation, 2G, in Finland is a year of perhaps even greater significance.

The pace at which many erstwhile national monopolies saw opportunities for exploiting their home-grown FSAs by reproducing their mobile operations abroad can therefore not be understated. With their roots in developed economies MNOs spread quickly across developed and developing geographies during the latter part of the 1990s (Sarkar et al., 1999). By 1995 many of the telcos were offering 2G mobile voice and messaging across a range of geographies some of which, such as Bangladesh and Pakistan, where Telenor established operations had no history of fixed line telephony. Thus, although most investment took place in Europe, a substantial proportion was also located in emerging economies. Indeed, from the mid-1990s, mobile wireless network systems rather than fixed network systems swiftly became the main source of international expansion by telcos who thereby evolved into MNOs with an international footprint (often in alliance with local partners).

The commercial launch of 3G in 2001, when wireless voice telephony and messaging was supplemented with internet access that supported e-mail and internet browsing, MNO internationalization increased further. Thus, from its origins in the early part of the

1990s through to 2005, the dominant actors in the mobile telephony industry were MNOs such as Vodafone, Telefónica and Telenor (Chepkemoi, 2017).

Employing a systematic review of the extant research literature on the emergence of MNOs, Dike and Rose (2017) identify a number of internationalization antecedents. They note that in the initial phase many of the MNOs were state-owned mobile operators who were seeking to “enhance their organizational performance and develop competitive advantages by operating in multiple markets” (Dike and Rose, 2017:309). Essentially the MNOs leveraged the FSAs they had developed through their domestic operations in order to exploit economies of scale and scope. During the 1990s the privatization of state-owned operators further incentivized this drive for internationalization. MNOs’ decision to consider foreign locations was influenced by “favorable regulatory reforms in many countries, as well as the liberalization and opening of markets to competition and the licensing of more MNOs” (Dike and Rose, 2017:310). Although initial market entry, particularly in higher risk locations, often involved alliances with local partners as a means to reducing the liability of foreignness, majority or full ownership was eventually often the preferred ownership mode. Typically, the MNO internalized and controlled the whole value chain in each country of operation including network equipment infrastructure and spectrum, operations, billing, retail and distribution (Peppard and Rylander, 2006).

Thus, once regulatory reforms across many countries opened markets to foreign-owned MNOs, the issue was one of bidding for national operating licenses. Once obtained, MNOs were able to replicate their business models across markets enabling them to reap the benefits of their FSAs. MNOs came to the view that while local partners had been useful for obtaining local legitimacy and for developing local distribution systems, these partners could rarely contribute to the development of the underlying MNO FSAs. For example, in the case of Telenor, in the early part of the new millennium it made an explicit “up or out” decision. The view was that majority ownership and managerial control was so much more preferable to joint ventures that in locations where the local partner could not be discarded Telenor would simply withdraw (Baksaas, 2019). Thus, as the MNOs developed their local presence and knowledge, over time the relative contribution of local partners diminished.

As Table 1 illustrates, the initial FSAs possessed by MNOs such as Telenor were two-fold (Dasi et al., 2019). First, they had superior competences in getting in place the necessary *network infrastructure* such as towers and base stations. In holding the towers and base stations, MNOs were able to control the network infrastructure so that they could differentiate on network coverage and capacity. Second, MNOs had *marketing expertise* in the sense that they had substantial experience in using local customer knowledge to design local price plans, to establish local brand recognition, and to operate efficient sales and distribution through sales outlets. Typically, expatriate managers transferred and maintained the integration of these two FSAs in the foreign operations. The superiority of the MNOs’ two FSAs was such that from the mid-1990s foreign governments were keen to attract them and to have them bid for operating licenses.

These initial FSAs evolved and developed. With local presence Telenor and other MNOs acquired foreign market knowledge that led to the development and evolution of their FSAs. Eriksson et al. (1997:354) distinguish three dimensions to the local market knowledge that is developed through “durable and repetitive interactions” in foreign markets. In addition to broad internationalization knowledge on how to establish and run international operations, they identify *foreign business knowledge* not least in the sense of understanding local taste. In developing their local marketing knowledge including developing networks of sales outlets and pricing strategies, MNOs reduced their “liability of foreignness” (Johanson and Vahlne, 2009). Eriksson et al.’s (1997) third dimension is *foreign institutional knowledge*. For MNOs understanding how to design normatively legitimate employment practices, contracts with local subcontractors in the host country, and how the authorities are currently framing the process for acquiring new licenses constituted an additional FSA that moderated their “liability of outsidership” (Johanson and Vahlne, 2009).

In summary, as MNOs such as Telenor, Telefónica, and Vodafone pursued operating licenses across geographies they ‘replicated’ their vertically integrated model in each country of operation (Winter and Szulanski, 2001). The need to fine-tune services to local markets meant that MNOs prioritized local adaptation rather than global integration leading to multi-domestic structures (Elter et al., 2014). Underpinning this initial expansion was a particular combination of initial FSAs: the ability to construct physical networks and to market mobile services. These are non-location bound FSAs and could therefore be transferred and exploited in other countries. In addition, they developed a further FSA, “local insidership”, which is a location bound FSA that can only be exploited in its particular market. Attempts at developing transnational learning and scale efficiencies (Bartlett and Ghoshal, 1989) across locally focused national business units were generally limited (Gooderham et al., 2016). As late as around 2015, this multi-domestic approach was apparently a successful mode of operation with gross margins typically around 40% (Factset, 2019).

### 3.2. 2010–2020 - the decade of lost opportunity

The launch of 4G and mobile internet connectivity in 2010 was ostensibly another boost for MNOs and the wider mobile telecom ecosystem. By 2015 the mobile telecom ecosystem generated over US\$3.1tn of economic value-added, equivalent to 4.2% of the global gross domestic product and provided 17 million jobs directly and a further 15 million jobs indirectly (GSMA, 2016; Dike and Rose, 2017).

However, by around 2015 it was clear that MNO growth was slowing, not only voice and messaging but also internet connectivity as the worldwide market for mobile approached saturation. One tangible factor was that national regulators, particularly those in developed countries, between 2010 and 2015 augmented competition by increasingly compelling MNOs to share their network infrastructures with *mobile virtual network operator (MVNOs)*, causing prices for mobile services to decline (Fierce Wireless, 2015). Between 2015 and 2020, the combined market capitalization of the wider European telecoms sector buckled. In 2020, it was 75% of what it was in 2000 (Financial Times, 2020a). The outcome was that heavy debt burdens became prevalent across many of the players in the industry with their market capitalizations dwarfed by their borrowings (Financial Times, 2020b). Telefónica was particularly

indebted and in addition to pulling out of South America except for Brazil, it sought to consolidate its operations by merging its UK unit O2 with Liberty Global's Virgin Media in search of efficiencies and financial stability (Financial Times, 2020a). Even the debt-free MNO Telenor prioritized the pursuit of efficiencies in the context of increasingly challenging markets (Elter et al., 2020).

The paradox of this decline is that it took place in an era when MNOs with the introduction of 4G in 2010 began to supply connectivity. While 1G delivered voice-service, 2G voice and messaging services, and 3G added the first viable internet access useful for e-mail and web-browsing (Hess and Coe, 2006), 4G, provided mobile broadband internet-connectivity (Agrawal et al., 2015). In 2018, 4 billion people had access to internet connectivity (Kemp, 2018) of which three quarters derived theirs from MNOs (GSMA, 2018). With the launch of 4G, technology platform companies such as Google, Amazon, and Facebook, which had developed their businesses providing services over fixed-line internet rapidly transformed their businesses to a mobile first strategy. Indeed around 2010 Google even coined "mobile first in the cloud", the leveraging of mobility and the cloud to fundamentally change the way people work, as their strategic enterprise vision (Rowinski, 2011).

In addition to the opportunity 4G provided to develop digital services, 4G also posed a threat. The internet companies such as Skype, Facebook Messenger, and What's app started offering free mobile versions of their voice and messaging services that had previously only been available through fixed-line. To mitigate this threat to their business models that had been built on voice and messaging, the MNOs responded by bundling voice and messaging with their mobile internet connectivity services (OECD, 2015). Incapable of using connectivity as a means to develop into providers of digital services to consumers and businesses, MNOs settled into being suppliers of best-effort internet connectivity that digital firms exploited. The result was that:

*"Dominance of the communications market ...passed to a different breed of companies — led by Google, Apple and Facebook — that have used the pipes and masts installed by telecoms companies around the world to capture the lion's share of digital profits..."*

(Financial Times, 2019)

In other words, during the 4G era, as Sigve Brekke, the CEO of Telenor, expressed it, MNOs "failed to monetize connectivity" beyond selling a best effort connectivity (Brekke, 2020).

Elter et al. (2020) have a two-fold analysis of this general failure by Telenor and MNOs in general to monetize 4G by capitalizing on connectivity to develop digital services. Over and above a lack of investor support for a digital services strategy, they point to a lack of capabilities not least in developing services. Voice, messaging, and internet connectivity services were embedded in the equipment infrastructure MNOs acquired from companies such as Ericsson, Nokia, Cisco and Huawei. The task of Telenor and the other MNOs was to construct and operate the network infrastructure and to offer these embedded services differentiated by price-plans. Thus, given the strong focus on operating the hardware and lack of experience of service development, MNOs lack of capacity to innovate in the area of digital services is arguably unsurprising.

Thus, as Table 1 sets out, in combination with local presence and a multi-domestic model of internationalization, while Telenor's FSAs in the 3G era were well-suited for achieving competitive international positioning, these same FSAs were distinctly less so in terms of the requirements for developing and rolling out globally standardized software platforms during the 4G era. In contrast to the hardware logic of the MNOs, the new asset-light digital service providers such as Google, Facebook and Netflix at their inception had FSAs that underpinned both a software logic and a global approach to service delivery (Dasi et al., 2019).

Elter et al. (2019) document top management's awareness of the need for Telenor to develop FSAs in order to respond to the opportunities 4G constituted and its awareness that a failure to do so would mean "Telenor ending up as a utility, limited to selling connectivity based on a semi-redundant industry platform" (Elter et al., 2019:174). Further, they show that Telenor's top management had a clear view of the capability system Telenor would need to develop in order to build a software platform that could host digital services. A DSP strategy required internal employee development but, more significantly, the recruitment of people with relevant competencies and the acquisition of firms that could extend the resource base. In particular, Elter et al. (2019) examined the attempt by Telenor to apply an ambidextrous solution to developing software platforms in order to become a digital services provider. They trace the formulation of a DSP strategy that involved the establishment of a distinct software-based digital services unit, Telenor Digital, that was to operate in parallel with the extant hardware-based connectivity business. However, despite its 'sensing' and 'seizing' (Teecce, 2007), Telenor lacked the FSAs necessary to convert its various initiatives at acquiring new FSAs beyond its firm boundary (Lee et al., 2021) into scalable FSAs that could rejuvenate its asset portfolio for the 4G era. The new recruits left, and Telenor Digital was dismantled. Telenor concluded that its business models for connectivity and digital services were incompatible and it abandoned its DSP strategy in favor of upgrading its connectivity provider role and a digitalization of its operational processes. In terms of location requirements, while the need to retain operating licenses meant that local presence remained important, however, as Telenor reinforced its role as a standardized connectivity provider, it put more emphasis on global scale and consolidated value chains. In so doing, it became somewhat less multi-domestic and more globally integrated in the mode of its internationalization. In this regard, Telenor was typical of the MNOs (Business Wire, 2019b).

As noted above, one effect of their lack of FSAs during the 4G era and their subsequent failure to develop the software and data-management capabilities required for the provision of digital services was that Telenor and the other MNOs lost substantial sources of traditional revenue to global digital firms such as Facebook Messenger, iMessage and WhatsApp who offered both free voice and messaging services. Heinrich (2014) calculated that by 2014 lost revenue from voice and messaging amounted to nearly \$400 billion. The MNOs response was to bundle voice and SMS with connectivity to ensure that they retained some grip on the voice and messaging market. The outcome was that connectivity became the major source of revenue for MNOs (Elter et al., 2020). Indeed, by 2018, 97% of Telenor's revenues derived from connectivity. Instead digital firms such as Facebook, Google and Netflix used the connectivity supplied by MNOs to underpin their digital business services models so that during the 4G era, these firms succeeded in reaping global

scale advantages from their digital services.

Another, separate, development during the 4G era was the consolidation of the telco equipment vendor industry into five main vendors, Huawei, Nokia, Ericsson, ZTE, and Cisco (Telecomlead, 2020). The result was that these companies captured scale advantages on the construction and installation of telco-equipment (Korzeniowski, 2006). Further, they developed their business model from selling equipment to also offering MNOs the operation of the network infrastructure as a service (NaaS) (Gerhardt et al., 2013). There was a significant uptake of NaaS by MNOs (Linker, 2020; Mordor Intelligence, 2020). In the case of Telenor in order to become more price competitive in 2018 it applied a novel form of outsourcing in its network operations. The new agreements with the equipment vendors involved risk sharing and joint co-development of new automated network operations. In addition to this variant of outsourcing, like other MNOs Telenor outsourced a range of other operations including customer call-centers and substantially greater use of external marketing agencies. Thus, during the 4G era, Telenor, like MNOs in general, increasingly viewed itself as having its main FSA in the orchestration of resources located beyond its firm-boundaries. One significant consequence of this reliance on external use of resources was that like many other MNOs, Telenor substantially abandoned its original FSAs in network infrastructure and marketing. As such, Telenor became a hollowed-out provider of 4G connectivity but lacking in the capabilities to use it to generate digital services.

Thus, as Telenor and MNOs in general enter the 5G era, what remained in terms of FSAs is their ability to orchestrate external actors. However, we argue that because connectivity provision and the need to retain operation licenses had necessitated local market presence, Telenor possessed significantly more local insidership than the global digital firms. Further, we will argue that local insidership could constitute an FSA in the 5G era. Our argument builds on insights in the work of Brouthers et al. (2016) (see also Dasi et al., 2019) that in an era when national governments are increasingly seeking to control, curtail and even preclude global digital firms from their markets, local insidership could be of substantial long-term value. While to date there is no firm evidence to support this notion there are indications that global digital firms are being subjected to increasing levels of regulatory friction across markets. To take two examples from very different markets. In the EU, regulators argue that the world's largest online platforms such as Google and Amazon have gained "gatekeeper status" and are using the control they have of marketplaces where they also sell their own products and services to potentially disadvantage smaller, local competitors. The EU's prospective Digital Services Act aims at tackling "the entrenched advantages" enjoyed by "Big Tech" by forcing the likes of Google and Amazon to share customer data collected on their platforms with business users active in the same commercial sphere (Financial Times, 2020c). The Act is designed "to ensure a level playing field for all digital companies, regardless of their size by lay(ing) down clear rules for big platforms - a list of 'dos' and 'don'ts' - which aim to stop them from imposing unfair conditions on (small, digital) businesses" (European Parliament News, 2021). In Pakistan, the authorities have sought to regulate the information and communication technology landscape in order to exert control over global digital platforms by requiring data localization, i.e. the storage of citizens' data in data centers within Pakistan's border (Malkani, 2020). Introduced in November 2020, this set of "vaguely worded" rules "granted the government broad authorities to pressure companies to restrict access to content and facilitate exceptional access to user data" (Global Network Initiative, 2021). Companies that fail to comply could be subject to fines of up to 500 million rupees (over US \$3 million).

If the 4G era was a decade of lost opportunity for Telenor and the other MNOs in relation to consumer markets with revenues migrating to the born global internet companies, MNOs are conscious that 5G offers new opportunities for novel digital services and significant new revenue streams particularly within the business market. Foster (2019) summarizes the MNO perspective as "Telco leaders bullish on benefits of 5G" and quotes GSMA director general Mats Granryd as stating at the 2019 Mobile World Congress:

*"The arrival of 5G forms a major part of the world's move towards an era of intelligent connectivity, which alongside developments in the internet of things (IoT), big data and artificial intelligence (AI), is poised to be a key driver of economic growth over the coming years. 5G is expected to add \$2.2 trillion to the global economy by 2034. We (i.e. MNOs) will connect more than a billion new people to the mobile internet over the next few years, spurring adoption of mobile-based tools and solutions in areas such as agriculture, education and healthcare, which will improve livelihoods of people around the world."*

Rob van den Dam, the IBM Global Telecom Industry Leader has a similar view:

*"The blending of 5G, edge computing, and artificial intelligence (AI) provides a potent opportunity for (MNOs) to create much-needed new revenue streams. This blend already provides a unique foundation to support new groundbreaking use cases in almost every industry, from manufacturing and automotive to healthcare and agriculture"*.

(Dam, 2020)

The 5G era is thus one where local presence will be essential to serve local businesses. It may be the case that the local knowledge and local insidership MNOs such as Telenor have developed through local presence constitutes an FSA in the sense of superior understanding of the workings of local regulations. Further, the local insidership of MNOs may make them more acceptable as business partners than global digital firms.

The issue we now address is the likelihood with the introduction of 5G that MNOs can, in addition to exploiting their orchestrator capabilities and local insidership, transform other capabilities they possess into FSAs so that they are significantly more than best effort suppliers of connectivity. In particular, we draw on the experiences and perspectives of Telenor.

#### 4. Methodology and data

Since 2012 our four-person research team has had access to Telenor and has collected data through interviews and company internal documents leading to a series of publications (e.g. Elter et al., 2014; Gooderham et al., 2016; Elter et al., 2020). One member of

the team is employed in the Telenor research department. In the latter part of 2019 and through 2020, we carried out an in-depth case study of Telenor that focused on our current research issue concerning the challenges involved in developing the capabilities to engage with 5G digital services.

In addressing this issue, we drew on data and findings from our previous research not least in relation to the lack of digital transformation during the 4G era. In terms of new data, given the exploratory nature of our research into Telenor's approach to 5G, our team member located in the Telenor research department used participatory observation (Vinten, 1994) in multiple workshops with a broad set of Telenor leaders and experts (see Appendix A). The participatory observations allowed the researchers to identify the strategic opportunities and business challenges the company is working on as it enters the 5G era.

Three topics were covered in the workshops. One series of workshops involving Telenor experts, business developers and managers addressed 5G and Edge computing business opportunities. A second series of workshops were held to prepare analysis and discussion documents to top executives and the board of directors about strategic choices related to digitalization and 5G. A third series of workshops addressed organizational implications and need for changes driven by digitalization and 5G. This workshop participation was supplemented with access for the whole research team to Telenor internal documents that were either input to or output of the workshops.

We were also interested in the external sources of analysis our informants rely on for decision making. This led us to a series of analyses from industry-organizations such as GSMA - a trade organization uniting more than 750 MNOs worldwide and 400 companies in the broader mobile eco-system; America 5G – an industry trade organization composed of leading telecommunications service providers and manufacturers; TM-forum – a global industry association for telecom service providers; from consulting companies specializing in telcos such as [STL.com](http://STL.com) and [Omdia.com](http://Omdia.com) and industry news-sites such as [telecoms.com](http://telecoms.com) and [fiercewireless.com](http://fiercewireless.com). The commonalities between these external analyses and the assessments of our Telenor informants causes us to view the Telenor case as representative of many of the incumbent MNOs such as Telefónica, Vodaphone, Veon, and Orange, all of whom are grappling with the same 5G related issues. In order to further observe 5G related trends from the viewpoint of other MNOs, as well as hardware vendors such as Ericsson and Nokia, during 2020 three members of the research team attended two industry conferences, “The Digital Transformation World Conference 2020”, and the “2020 Nordic Conference on ICT: 5G for Industry & Society.” These conferences involved presentations followed by discussions of the 5G challenge from a range of MNOs including Telefonica, AT&T, Orange and Deutsche Telekom and equipment vendors such as Ericsson, Huawei and Nokia.

Another source of 5G perspectives we drew on are reports from the EU-funded 5G public private partnership 5G-vinnie.eu (European Commission, 2020). The EU is investing EUR 700 million in 5G research through its Horizon 2020 program and with additional funding from private industry 5G-vinnie.eu has a budget of more than EUR 3 billion. Using this diverse set of data, we have formed a view of the challenges facing Telenor and MNOs in general as they enter the 5G era.

## 5. The rebirth or the marginalization of the MNOs?

MNOs have followed the shifts in technologies from 1G to 4G and in late 2020 began to embark on the shift towards 5G, the second wave of digital transformation. For example in the US, regulators on December 23, 2020 concluded the first part of the process of auctioning off the radio-frequency bands needed to roll out 5G that will have transmission speeds ten times higher than 4G connections and a capacity increase of 20–25% thereby offering customers considerably more speed and capacity over the mobile internet (Economist, 2021).

However, arguably, of greater significance is the potential of 5G technologies to enable the development and offering of novel digital services:

*“5G will provide virtually ubiquitous, ultra-high bandwidth, and low latency ‘connectivity’ not only to individual users but also to connected objects. Therefore, it is expected that the future 5G infrastructure will serve a wide range of applications and sectors including professional uses (e.g. Connected Automated Mobility, eHealth, energy management, possibly safety applications, etc.). 5G will also be the ‘eyes and ears’ of Artificial Intelligence systems as it will provide real-time data collection and analysis. At the same time, it will bring the ‘cloud’ to a new dimension by enabling the distribution of computing and storage throughout the infrastructure (edge cloud, mobile edge computing)”.*

(European Commission, 2020)

5G represents a profound shift for MNOs as 5G technology embraces the technical principles that have been embedded in the IT industry the last decades. With 5G, services will be developed by software and not specialized telco computer-hardware as has been the case to date, and the operation of the telco-software embraces the cloud architecture in a similar manner as the large internet companies. Furthermore, customers are demanding digital interaction with their operators and that MNOs are digitalizing sales and distribution (Little, 2019). Consequently, the value of MNOs' FSA in building and managing local physical distribution networks is diminishing.

We observe that MNOs are conscious of their “failure to monetize 4G” beyond selling connectivity. While having to invest in 5G, the question is whether MNOs have or can develop the FSAs that enable them to build capabilities to capture value from 5G over and above selling connectivity. The World Economic Forum (2021:7) sees two broad 5G areas of opportunity. In addition to facilitating how individual consumers “live, work and play”, 5G has the potential to “help transform industrial processes and ways of working through enabling connectivity in factories, offices and other places of industrial activity.”

This raises the question, with the introduction of 5G, could MNOs acquire and use technology capabilities to co-create digital

solutions for business customers together with other business partners? This will involve developing the capabilities to apply enabling technologies such as IoT support, Advanced 5G slicing, Network Function Virtualization, and Edge Computing (Elter et al., 2020) in combination with new revenue models. Failure to do so will mean that MNOs continue on the path established during the 4G era of being suppliers of connectivity offering an undifferentiated and price sensitive utility.

Our research issue is thus: What are the FSAs MNOs need to develop in order to become more than a provider of best-effort internet connectivity as they enter the 5G era?

In its assessment of what the introduction of 5G will mean for MNOs, the industry trade organization of telecommunications service providers and manufacturers, “5G Americas” stated:

*“The fifth generation (5G) of wireless communications technology is fundamentally transforming the telecommunications industry. The evolution of wireless data applications and the increasing popularity of smart devices have led to a massive proliferation of mobile data traffic, creating challenges and opportunities for mobile service providers. 5G is expected to enable further economic growth and digitization of a connected society of people and all possible things. 5G is gearing up to enable new use cases such as smart cities, smart agriculture, smart grids, energy, smart manufacturing, autonomous driving, logistics, public safety and numerous other verticals”.*

(5G Americas, 2020:5)

To serve these markets, McElligott and Newman (2020) observe that there is a view among public cloud providers, technology vendors and startups in the edge computing ecosystem that MNOs could offer, in combination with 5G core-network-FSAs, edge computing thereby developing a B2B market presence. By edge computing we are referring to the provision of low latency, high bandwidth, device processing and data offload as well as trusted computing and storage close to the end users such as factories and other enterprises that need to automate industrial processes within or at the boundary of MNO networks (Ericsson, 2020). One of the reasons for caching and processing data closer to the customer data centers is that it allows both the MNOs and their customers to enjoy the benefit of reduced backhaul traffic and costs (STL Partners, 2020).

Thus, unlike the cloud providers such as Amazon and Microsoft that offer data processing from data centers hundreds or thousands of miles away, the MNOs as local national operators could offer significantly lower latency and improved efficiency by processing data closer to the user. As such,

*“The telecoms industry has an important role to play in edge computing because (MNOs) provide the connectivity that edge computing requires. The powerful combination of 5G connectivity and edge computing can unlock new latency-sensitive consumer and B2B services, such as gaming and telemedicine”.*

(McElligott and Newman, 2020:3)

Drawing on a combination of interviews and survey data from 55 MNOs in 2020, McElligott and Newman (2020:4) find that MNOs have indeed “put a lot of thought into their strategies around edge computing.” These strategies are distinctively national rather than global and aim at serving factories and similar operations such as campuses. McElligott and Newman’s survey results indicate a few first-mover MNOs are deploying edge computing commercially, but more than a quarter are conducting trials.

This view of MNOs becoming providers of B2B edge computing is also a view shared by the global digital providers that successfully monetized 4G connectivity. Rather than viewing MNOs as competitors, these technology platform companies see the possibility of some form of alliance. For example, Bushaus (2019) records that Microsoft’s Eric Troup, Chief Technology Officer, Worldwide Communications and Media Industries acknowledges that MNOs have come to view hyperscale cloud providers such as Amazon Web Services, Google and Microsoft as competition, complaining that they have a distinct advantage because they aren’t hamstrung by regulation. However, in terms of the 5G enterprise market he sees a potential for partnership between the MNOs and the “digital natives.” Troup stated: “Leveraging 5G to deliver the next generation of enhanced user scenarios is a challenge we [Microsoft] cannot solve alone and the service provider can’t solve alone.” Thus, “It really is a partnership discussion.” Troup’s analysis is that as the edge expands MNOs can play a crucial role delivering 5G connectivity and value-added services such as data analytics, security and quality-of-service guarantees: “We are not going to compete by building an edge network with 5G – we have no plans whatsoever to do the last mile.”

Troup’s emphasis on that, “We’re not building the 5G edge. We are using it – we need it to work – but we’re not building it”, indicates that Microsoft does not want to invest in edge facilitating infrastructure that for them is non-differentiating. Their preference is for that investment to be undertaken by the MNOs. McElligott and Newman (2020:30) identify a number of barriers to MNOs committing to the edge computing value chain. Over and above considerations of whether they should diversify from being utility providers of connectivity and uncertainty as to the size of market opportunities, the fundamental issues are those that prevented the MNOs from monetizing 4G: the availability of internal skills and the FSAs of the organization more broadly and their limited ability to make speculative, long-term investments. In the next section we examine how these issues are playing out at Telenor.

## 6. 5G at Telenor

We structure our case study of Telenor in line with the four areas that comprise Table 1, Telenor’s strategic positioning, the main FSAs and FSARs required for competitive positioning, location requirements and dominant mode of internationalization.



## 6.1. Telenor's strategic positioning

In our case study of Telenor, we observed the company considering two distinct 5G markets. The first of these involved capitalizing on the customer base in order to sell value added services to individual consumers to maintain profitability in the consumer segment. The second is to capture parts of the considerable growth expected to come from 5G enabled services to enterprises and governments (B2B). We observe that it is the second of these strategic positionings that Telenor views as its primary positioning for revenue growth.

### 6.1.1. Capitalization of the existing individual consumer base

Historically, MNOs such as Telenor have competed on price or taken a premium position based on having superior networks with respect to coverage and quality. While network coverage and quality are important differentiators, this relative advantage has been significantly reduced as telcos in general commonly offer sufficiently good networks. For consumers, 5G will offer more speed and capacity to mobile handsets. In response, Telenor is planning to rapidly digitalize its customer relation to serve consumers more efficiently. KPMG reports that digitalization of all aspects of customer relations from sales to service is a common ambition among MNOs. Beyond this, among the Telenor managers we interviewed, there was limited confidence that Telenor has the capabilities to develop into a significant developer of services with consumer appeal, thus the company is choosing to focus on reselling value added services to the consumer market. Other MNOs appear to share this analysis that 5G is not expected to provide any significant growth potential in consumer markets. The view is that for MNOs, "The future of 5G lies in the enterprise, not the consumer market" ([Business Wire, 2019a](#)).

### 6.1.2. Provision of 5G enables services to enterprises (B2B)

The second approach to 5G is to use technology capabilities to co-create digital solutions for local business customers together with other business partners, both global and local. Telenor views developing new advanced services for the business market as viable. One tangible consequence was the establishment in September 2020 of Telenor's first transnational structure, its "Nordic Product House", for the coordination of the development of 5G business services across its four previously autonomous Nordic business units.

Telenor aims to significantly enhance its B2B activities through the production of multiple services for specific industry verticals, and is currently working on customer cases within health, the public sector, logistics, and fish farming. In addition to developing close collaboration with business customers in order to precisely respond to their needs, Telenor will have to fundamentally revamp its business model to serve this market. Further, it is within B2B that acquiring and developing capabilities in IoT, AI, cloud computing and edge computing will be critical for 5G related FSAs. Telenor informants report that a key feature of 5G in the context B2B will be low latency, higher bandwidth, and a more secure connection that enables business critical real-time solutions. Edge computing is essential for providing these solutions.

That is, distributed computing power has to be located close to where the computing will be deployed to achieve low latency for real-time business applications. This is critical for IoT solutions where data from sensors and cameras need to be computed using AI algorithms on the spot in order to facilitate an instant reaction. Edge servers will typically be used to compute algorithms, while the centralized cloud platforms will be used to store massive data for machine learning and AI.

5G enabled features including edge computing that when available will be utilized through application programmable interfaces (APIs) for software developers to create new digital business solutions. Together with AI and machine learning, edge solutions can self-analyze and proactively report problems and make real-time corrective action (e.g. self-driven cars, remote surgery, manufacturing etc.).

Shifting to computing on the "edge" will create a new architecture of connectivity-based services, and the expansion of 5G networks will result in far richer exchanges. Take for example the automobile industry, where vehicles are set to be "data centers" on wheels instead of just over-the-air updates. Edge computing and high-speed connections to vehicles are prerequisites for automated real-time traffic coordination. In an interview in [Financial Times \(2020d\)](#), Adam Burden an Accenture Executive predicts a shift towards edge and cloud-based computing in automobiles that will impact vehicle safety, remote driving, and usage-based insurance and production. Analysis of images streaming from a camera on the front right bumper of a self-driving car and matching it with detailed maps of location is best done instantly at the edge. The same applies to a range of other applications involving instant, local analysis of incoming data. Edge computing solutions require network connectivity between the IoT devices and the computers. With 5G the number of IoT devices can be increased from 10 thousand to 1 million per square kilometer, customers will have a low-latency, high security, and high reliable mobile network technology enabled by network slicing. This will allow real-time business critical solutions to be run over the 5G mobile internet.

Together with edge computing, AI, and IoT, 5G enables cloud capabilities located close to the end-user that enables the provision of critical information and process automation linking the physical to the digital world. These technologies will have transformative implications for numerous industries and use-cases involving radically more advanced robotics, tagging and tracing of assets, improved global logistics, remote monitoring and predictive maintenance of machines and equipment, smart stores that reduce waist and improve customer experience, smart buildings that are significantly more energy efficient, secure and allow for better utilization of space, and smart cities that better utilize parking spaces manage traffic congestion, improve waste handling, water resource management, and lighting and electricity management.

Microsoft visualizes edge computing as an "intelligent cloud" or "intelligent edge" connected through 5G. The development of computing edge solutions will be done by software companies and system integrators. Our Telenor informants report that during 2020, "a fierce battle for strategic market positions" has started between MNOs, hyper-scalers (such as Amazon, Google, and Microsoft) and system-integrators (such as Evry & Accenture). However, given Troup's - "(the hyper-scalers are) not building the 5G edge. (They) are

using it" - assertion, it seems plausible that because each the hyper-scalers and the MNOs possesses distinctive capabilities that as well as competition, collaboration will evolve and with it the emergence of an eco-system for B2B digital-industry solutions. In part this will depend on FSA acquisitions by the MNOs, but the FSAR of scalability will also be critical. We now examine these in detail.

## 6.2. Main FSAs and FSARs required for competitive B2B positioning

For MNOs to succeed with the transition to advanced IoT and 5G services, four sets of FSAs are seminal. These are summarized in the far right-hand column of [Table 1](#).

The first set of FSAs involves the upgrading of the 5G network with edge computing and provision of APIs in order to utilize 5G features. For MNOs to provide advanced 5G services, all parts of the network from radio transmission to the core network requires a fundamental upgrading. This upgrading span network slicing that enables network priority, which is an end-to-end, secured, and customized network for particular business-critical solutions. It also involves access to network function virtualization (NFV), a technology that allows software applications to access features of the 5G network through APIs. Most MNOs including Telenor are upgrading the 5G network starting with the radio network to allow increased speed, capacity, and the potential for significantly less lag time. For the case of Norway, Telenor expects all parts of the network to have been upgraded by 2023. In the view of [Akkaraju and Waldemar \(2021\)](#):

*"By creating a network slice for an industrial company, we see several scenarios come into play. Industrial data platforms are already able to leverage multiple sensors monitoring equipment, and maintenance can be predicted and performed based on past and present sensor data. 5G ensures these activities are performed faster, without lags and spatially much more accurately. Cameras will be able to do surveillance on an industrial plant area and run various analyses on video feeds in order to operate that precise area safely and more efficiently. A 5G network slice would also enable seamless communication between machines, people, and objects in (for example) a mining area."*

The second set of FSAs comprises the development of a portal that facilitates the exposure of APIs to partners. To stimulate 5G service innovation, the network infrastructure vendors such as Ericsson, Nokia and Huawei are promoting the use of APIs to expose 5G network resources ([Varnai, 2019](#)). The development of this set of FSAs is underway at MNOs such as Vodafone, Telefonica, Orange, Telia as well as Telenor. Using 4G these MNOs are exposing APIs to various existing platforms through developer portals. This application is set to expand significantly as 5G is adopted.

The third set of FSAs involves IoT and AI. 5G supported IoT can be applied across a significant range of applications including smart-factories, smart-buildings, smart-cities, smart-utilities, smart-homes, security and surveillance, agriculture, retail, and health. IoT devices are capable of generating substantial amounts of data in real time with low-latency monitoring provided by artificial intelligence (AI). The challenge for Telenor and MNOs in general is to use their in-house AI competencies to inform the strategic selection of AI resources.

The fourth set of FSAs involves possessing advisory and system integration capabilities. Telenor informants report that they are advising customers on how to deploy 5G and IoT technologies. The latter requires system integration FSAs.

An indication of Telenor's development of 5G related FSAs is that its Norwegian business unit is engaged in the co-creation of 5G business solutions in areas such as logistics, fish-farming, Norwegian hospitals, and the Norwegian Armed Forces. To take one example from fish-farming, Telenor is together with its partners developing solutions that enable fish-farmers to identify among vast numbers of individual fish any that are developing early symptoms of disease. These can then be removed from the stock before contaminating other fish.

For MNOs,

*"To succeed with 5G in heavy industry, partnerships and continued work on standardization is essential. We require a combination of industry domain experts, telco providers and technology specialists to design fit-for-purpose 5G solutions".*

*(Akkaraju and Waldemar, 2021)*

However, likely competitors will include the global tech giants Microsoft, Google and Amazon, specialized platform companies such as Cognite, and not at least the telco infrastructure vendors such as Nokia who can bypass the MNOs and serve enterprises directly with their technologies thereby pushing the MNOs back into their current utility connectivity position ([Lopez, 2020](#)). Thus, while MNOs are aiming to develop the FSAs required to serve the enterprise market with advanced IoT and 5G services, the likely actions of other actors mean that success is by no means ensured.

Scalability, or the FSAR required to standardize and scale FSAs across country operations, is also a concern. While Telenor intends to co-create solutions with business-customers and partners, the "DNA" of an MNO is to offer standardized services at scale. Thus, while developing solutions for the B2B market involves local solutions, Telenor's ambition is to standardize these and scale them in the first instance across its Nordic operations through the establishment of its "Nordic Product House". In its initial phase, the aim is to develop solutions for the Nordic countries, starting with IoT solutions and security. The head of the Nordic Product House, Jesper Hansen, views IoT as "one of Telenor's strong suits, particularly in the Nordics" as a result of working with major customers such as Volvo, Scania and others to ensure connectivity solutions for their heavy assets. In addition, he points to Telenor Norway as having built up a strong IoT base over the years including Smart Digital products & services.

*"We want to strengthen capabilities at the Nordic level, and that includes the development of new product areas. While there may be four different markets, we see common customer needs across the region. If we are able to combine resources and capabilities from the BUs, we*

*can leverage our scale and enable more innovation across the markets. Essentially, we will create opportunities to grow and bring the best products and services to our customers, and in doing so we strengthen local value propositions. One such value proposition is within Internet of Things (IoT)”.*

(Informant: Jesper Hansen, 3 December 2020)

However, by way of a rider Jesper Hansen adds that at the end of 2020, “IoT in Telenor remains decentralized and with limited synergies; and growth is stagnating.” Further, many of the areas “are not-yet-proven” and will involve “testing and failing fast.” That is, there is a recognition that while scalability across markets is an ambition there is no certainty that Telenor can leverage its capabilities particularly across its non-Nordic markets. On the other hand, to the extent Telenor is able to do so, its local insidership may enable it to sensitively respond to local regulatory requirements to a greater degree than its global competitors.

### 6.3. Location requirements

As we completed our case study, we observed that building on the many decentralized initiatives the Nordic Product House, Telenor was now scaling its offerings across its Nordic operations. Thereafter, the ambition is to exploit Telenor’s insider status in the Southeast Asian countries in which it operates to launch similar but locally adapted services. As such, Telenor is aiming to continue its replicator strategy.

### 6.4. Dominant mode of internationalization

Telenor’s mode of internationalization in the 2G/3G era was multi-domestic. While employing a replicator strategy, Telenor granted subsidiaries latitude to develop local value chains and locally adapted offerings. During the 4G or connectivity-provider era offerings became more standardized and there was a significant move towards globally integrating Telenor’s international operations. In the B2B, 5G, era if Telenor is to succeed, it will need to combine global integration with local responsiveness to the needs of local enterprises and to government sensitivities and regulations (Bartlett and Ghoshal, 1989).

## 7. Discussion

We have traced the evolution of MNOs in general, and Telenor in particular, from their relatively sudden and swift emergence as suppliers of voice and messaging (2G), followed by internet (3G) and mobile-broadband internet connectivity (4G). During the 4G era (2010–2020), MNOs failed to develop the required FSAs to monetize the opportunity to become digital service providers. Instead they remained best effort providers of connectivity based on the FSAs developed during the 3G era. The outcome was that mobile broadband internet connectivity was exploited by technology platform companies such as Amazon, Google and Microsoft to develop and launch their digital service offerings and who thereby “skimmed most of the value generated by 4G mobile technology” (Economist, 2022). In terms of internationalization we observe that while MNOs were well suited to rolling out 2G and, more significantly, 3G, to developing, as well as well as developed, economies, by exploiting their FSAs, they lacked the FSAs to exploit 4G. Despite sensing the requirements for new 4G FSAs and seizing elements of these, MNOs as illustrated by Telenor were lacking in the FSAs that would have enabled them to evolve into digital service providers. Consequently, significant value migrated from voice, and messaging to digital services provided by “born globals”.

As Telenor and the other MNOs enter the 5G era most of their original 2G/3G era FSAs in constructing network infrastructure and marketing are extinct. Even had MNOs retained these capabilities, they would have conferred little or no advantage in the 5G era. What MNOs such as Telenor have retained in terms of FSAs from earlier periods are orchestrating skills and, despite increased global integration during the 4G era, local presence involving local expertise, brand recognition and the trust that derives from local insidership that is particularly important when dealing with larger enterprises and government clients. Our case study of Telenor suggests that it and other MNOs are developing the FSAs, including local edge computing processing, to supply local enterprises with 5G enabled non-standardized services. In addition, but of less significance, they aim to be digital resellers of more standardized services that need to be adapted to specific local business needs. However, whether Telenor and other MNOs have the FSAs necessary for combining and shaping these FSAs into a viable business model remains uncertain. We identified the issue of the FSAR to achieve scalability across its operations as a particular issue. If that FSARs are not present, one should expect a continuing slide towards marginalization as suppliers of 5G connectivity. As such, MNOs that dominated their industry for nearly two decades will be further relegated to the periphery of their industry.

Martin and Eisenhardt (2004) have observed that firms operating in dynamic markets that are facing fading product-markets require a corporate entrepreneurship response whereby managers move their businesses into new market opportunities as the value of current market domains fade. The emphasis is on exiting from declining markets while simultaneously capturing and exploiting opportunities in more promising markets. Corporate FSARs are required for “patching”, that is getting the organization focused on significant business opportunities that involves remapping business units in order to create the conditions for the recombination of assets from within and beyond the firm (Lee et al., 2021). MNOs are well aware of the periphery scenario threat they face in conjunction with 5G and as a consequence many of them are experimenting with acquiring the FSAs necessary for the development of 5G and edge computing enabled services. The Telenor case illustrates these efforts. In creating its “Nordic Product House”, Telenor is attempting to position itself within IoT, security and 5G enabled services. By creating learning synergies in the area of IoT solutions and security across its four Nordic business units, Telenor is engaging in a transnational initiative that runs counter to

its multi-domestic legacy.

Digitalization of customer interaction (Turner, 2017) and softwarization of the 5G network (Condolici and Mahomoodi, 2018), are resulting in the blurring of industry boundaries in both the consumer and enterprise markets (Alturi et al., 2017). As industry boundaries blur, new competitors from the software and internet industries are entering the “old turf” of the MNOs. At the same time, given that they manage to develop new FSAs and to integrate these in their operations, the MNOs are positioned to utilize their current market presence based on local insidership to enter the turf of other industries.

As they enter the 5G era, Telenor, like other MNOs, is seeking to maintain its position in the consumer market by digitizing sales, distribution and customer services. Thus, they seek to capitalize on their customer base and digital distribution capabilities to resell bundles of adjacent services adapted to local taste to generate new revenue streams. However, while the consumer market will continue to be important, it is the B2B market that “promises a huge addressable market” (Mor, 2020). To tap into the growth potential 5G is expected to generate in the B2B market, MNOs will need to move up the value chain and build new FSAs to co-create services with customers and partners, and develop new business models building on their local insidership. However, as the 4G era illustrates, the issue of FSARs means that success for the MNOs is by no means guaranteed. Given the significance of local enterprise 5G solutions and given the MNOs’ local insidership across their various markets, MNOs do have a potential competitive advantage in relation to their global competitors from other industries.

## Acknowledgments

This research was supported by the RaCE program “Radical Technology-driven Change in Established Firms”. Grant: Norwegian Research Council 294458.

## Appendix A. Overview of participatory observation in workshops

Date	Description
17.08.20	Workshop on 5G enabled services and edge computing on a specific customer case-1. 17 leaders and subject matter experts participated. Customer case and technology solutions documented in a 20 page case report.
17.08.20	Workshop on 5G enabled services and edge computing on a specific customer case-2. 19 leaders and subject matter experts participated. Customer case and technology solutions documented in a memo describing next steps with the customer.
08.09.20	Three workshops on organizational implications of customer digitalization with a Nordic business unit. 5 leaders and subject matter expert participated.
15.09.20	
12.11.20	
12.10.20	Three workshops on technology trends in telco business and strategic implications. 5 subject matter experts participated. These workshops resulted in technology trend document and presentation to prepare strategic discussions among top executives.
19.10.20	
27.10.20	
12.11.20	Workshop on strategic implications of 5G and digitalization to prepare a presentation to executives. 8 subject matter experts participated.
25.11.20	Workshop with IT-department on organizational technology architecture implication of digitalization of customer interaction. 12 leaders and subject matter expert participated.
03.12.20	Whole day department gathering with knowledge sharing among 15 Telenor researchers and practitioners in Telenor working on developing and implementing 5G

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