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Double ambidexterity: How a Telco incumbent used business-model and technology innovations to successfully respond to three major disruptions

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We leverage the business model innovation and ambidexterity literature to investigate a contradictory case, the Swedish-Finnish Telecom operator TeliaSonera. Despite being challenged by three major disruptions, the company not only still exists but also enjoys remarkably good financial performance. Building on extant archival data and interviews, we carefully identify and map 26 organizational responses during 1992–2016. We find that the firm has overcome three critical phases by experimenting and pioneering with portfolios of business models and/or technological innovations. We describe this behaviour as double ambidexterity. We use an in-depth case study to conceptualize double ambidexterity and discuss its impact on the business's survival and enduring success.

1 | INTRODUCTION

One stream of business model research has addressed the relationship between technological innovation (TI) and business model innovations (BMI) (Baden-Fuller & Haefliger, 2013; Chesbrough & Rosenbloom, 2002; Tongur & Engwall, 2014). This stream of inquiry has its roots in the 1970s, although it only gained momentum when existing theories were unable to explain new phenomena emerging from Internet-based companies (Wirtz, Pistoia, Ullrich, & Gittel, 2016). During this time, companies such as Google were unable to capture the value from their search customers directly. Instead, they had to capture the value created from a second group of customers: companies seeking to advertise to the first customer group (Teece, 2010). These early articles from 2000 onwards investigated the role of business models in unlocking the value of technology. For example, based on a study of six successful spin-off companies from Xerox, Chesbrough and Rosenbloom (2002) meritoriously describes both what the fundamental constituents of a business model are and how BMI has made capturing value from underutilized technology possible. More recently, Baden-Fuller and Haefliger (2013) suggest that the relationship between BMI and TI is bidirectional. While they agree that business models mediate the relationship between TI and firm performance (or value capture), they also emphasize that BMI—with open business models, in particular—is able to boost the ability to develop the right

technology. In a similar vein, Tongur and Engwall (2014) argue that BMI is necessary to manage technology shifts and that the management of technology shifts is a process of managing both TI and BMI.

Furthermore, the study of business models has also been conducted on different levels of analysis, and Wirtz et al. (2016) show that it has moved from the product level to the level of business units and organizations. Studies on the organizational level have also looked into the role of TI and BMI in transforming industries, such as newspapers (Holm, Gunzel, & Ullhøi, 2013; Rohrbeck, Günzel, & Uliyanova, 2012) or electric mobility (Abdelkafi, Makhotin, & Posselt, 2013). Thus, the question of how TI and BMI interplay has implications not only for the management of firms but also for the dynamic of industry transformation (Bidmon & Knab, 2014).

Through our study, we want to contribute to the academic debate on BMI and the long-term performance of firms, taking into account the dynamic interplay of TI and BMI over time (Achtenhagen, Melin, & Naldi, 2013; Amit & Zott, 2012; Baden-Fuller & Haefliger, 2013; Björkdahl, 2009; Cavalcante, Kesting, & Ullhøi, 2011).

For our study, we sought an industry that has undergone multiple phases of discontinuous change and in which companies are expected to be particularly exposed to path dependency (Bidmon & Knab, 2014; Tushman & O'Reilly, 1996). We chose the telecommunication industry because it has been challenged by multiple market and technology-side disruptions. As an industry, telecommunication can seem

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paradoxical. On the one hand, it can be regarded as mature (that is to say, with fierce competition among existing players based mainly on price and performance); on the other hand, it can be seen as an emerging industry in which new technologies and new business logics emerge and converge, while it also provides a generic infrastructure for the digital society. For example, Skype has redefined the long-distance and video-call market seemingly unhindered by traditional entry barriers. Through the introduction of the iPhone in 2007, Apple has successfully created an enlacement of content and handset, thereby establishing itself as a key player in the telecommunication industry in which it was a new entrant. With the introduction of the Android operating system, which has already gained a 75% market share, and the subsequent acquisition of Motorola, Google has also established itself as a major player, which contributes to the migration of revenues from traditional to new market actors. Incumbent national operators had to witness their margins shrinking despite massive cost-cutting efforts, and the leading device manufacturer, Nokia, has nearly been wiped out. The “dinosaurs” in the industry are the telecommunication operators, which have dominated the industry even without being particularly innovative (Rohrbeck, Hölzle, & Gemünden, 2009). Theory predicts that such incumbents would be particularly affected by rigidity and hence in danger of being displaced by new entrants (Aspara, Lamber, Laukia, & Tikkanen, 2011; Chandy & Tellis, 2000; Doz & Kosonen, 2010).

We report on a longitudinal case study of the Swedish-Finnish Telco operator TeliaSonera. More specifically, we investigate how an incumbent used a portfolio of organizational responses (BMI and TI) to survive three waves of external discontinuous change (market and/or technology). We aim to shed light on the interplay of TI and BMI over time in order to investigate, in particular, its impact on firm performance, which has been identified as an important avenue for future research (DaSilva & Trkman, 2014; Massa, Tucci, & Afuah, 2016). We further aim to use the empirical richness of the single case study to provide more insights into the antecedents and outcomes of BMI (Foss & Saebi, 2017). Finally, we expect to be able to explore the conditions in which TI and BMI allow our focal firm to capture value (Massa et al., 2016; Zott, Amit, & Massa, 2011).

Our paper is structured as follows: we first present the theoretical backbone of our research, which rests on the BMI and (organizational) ambidexterity literature and form our conceptual model. We then present the research method: a longitudinal case study using three phases as embedded cases. This is followed by the detailed description of the discontinuous change encountered and the organizational responses. We then interpret our findings in the light of the predictions of the BMI literature and, based on the contradictions, develop the conceptualization of double ambidexterity. The article closes with a discussion of future research trajectories.

2 | THEORETICAL FRAMEWORK: TOWARD DOUBLE AMBIDEXTERITY

2.1 | Business model innovation

The research interest in business models and BMI has increased steeply with the emergence of new value capture frameworks

introduced by Internet companies (Foss & Saebi, 2017; Teece, 2010; Wirtz, Schilke, & Ullrich, 2010). In parallel, the rising attention toward open business models, in which focal organizations collaborate with users, third-party developers, and complementary partners to create value, have further catalyzed this interest (Baden-Fuller & Haefliger, 2013; Chesbrough, 2006; Thomke & von Hippel, 2002). However, the proliferation of research has also led to ambiguity in the description of what a business model is and the way in which it is a useful construct that justifies scholarly interest (Björkdahl & Holmén, 2013; Klang, Wallnöfer, & Hacklin, 2014; Massa et al., 2016; Massa & Tucci, 2013). To make sense of this situation and thereby create a foundation for cumulative research, it has been recognized that the scholarly debate around business models can be broken down into different sub-streams in which cross-fertilizing occurs within each stream but only to a lesser extent across each stream. Wirtz et al. (2016) distinguish between technology-oriented, organization theory-oriented, and strategy-oriented debates. They further note that all three streams start to converge in what they call the “modern business model sphere,” which discusses business models in a company, at the business-unit level, and at the intersection between the process and strategy domains (Wirtz et al., 2016).

Our research builds on this research, which has suggested that BMI not only mediates the relationship between TI and firm performance but may also influence the ability to develop technologies, particularly through open business models (Baden-Fuller & Haefliger, 2013). Such a two-way relationship opens up questions about when and under what conditions firms are able to create and capture value (Amit & Zott, 2012; Björkdahl, 2009; Günzel & Holm, 2013).

Past research has shown that companies not only need to obtain new technologies but also find new business models (Björkdahl & Holmén, 2013; Calia, Guerrini, & Moura, 2007; Chesbrough & Rosenbloom, 2002). This is done through experimentation with new business models (Rohrbeck et al., 2012; Sosna, Treviño-Rodríguez, & Velamuri, 2010; Tongur & Engwall, 2014). Magretta (2002), for example, points to the need for hypotheses, tests, and revisions. Chesbrough (2010) argues that companies must experiment with their business models while knowing that some will fail and that even failure will provide learning that can be applied in the future. Accordingly, successful experimentation is therefore an important catalyst for exploration of new possibilities, i.e., activity in which a firm engages commercially in a new market and/or technology space (Knab & Rohrbeck, 2015; March, 1991).

Moreover, BMI has been proposed as one of the main explanations both for the success of new entrants and for the ability of incumbents to fight back (Osterwalder & Pigneur, 2010; Teece, 2010). Consequently, using BMI is expected to be a key success factor that is particularly relevant when organizations become increasingly inert (Barnett & Carroll, 1995) and as their life-span appears to decrease dramatically (Foster & Kaplan, 2001; Louca, 2002). While the argument is compelling that incumbents should respond to discontinuous change through BMI, it appears that this has rarely been observed, with some notable exceptions such as Dell and IBM. One explanation for the lack of successful parallel BMI and TI may be that firms are not able to manage multiple business models and accept (partial) cannibalization of parallel business models (Velu & Stiles, 2013). Another explanation

may also be that they are not good at discontinuing established business models as they build new ones (Mehrizi & Lashkarbolouki, 2016).

2.2 | Toward double ambidexterity

When dealing with multiple business models in a firm, it has been suggested that the (organizational) ambidexterity literature may provide useful theoretical grounding (Markides, 2013). Organizational ambidexterity was introduced by Tushman and O'Reilly (1996) to emphasize the fact that firms need to master both evolutionary and revolutionary change to ensure long-term success and survival. Drawing on March's (1991) theory of organizational learning, they further specify that ambidextrous organizations have the ability to both explore and exploit, i.e., compete in mature technologies and markets where efficiency, control, and incremental improvements are important, and also compete in new technologies and markets where flexibility, autonomy, and experimentation are needed (O'Reilly & Tushman, 2013). Even after more than two decades of research on, and practice of, organizational ambidexterity, it is doubtful whether Tushman and O'Reilly need to alter their original observation from 1996 in which they stated: "While there are clear benefits to proactive change, only a small minority of farsighted firms initiate discontinuous change before a performance decline." This lack of proactivity has been attributed to the difficulty in overcoming three fundamental tensions: diverging strategic intents (profit vs. breakthroughs), customer orientation (tight vs. loose coupling), and personal drivers (discipline vs. passion) (Andriopoulos & Lewis, 2009). Some authors have argued that ambidexterity should be sought through organizational separation (O'Reilly, Harrell, & Tushman, 2009); others have argued that it can be achieved by building processes or systems that support individuals to overcome the tensions associated with ambidexterity (Gibson & Birkinshaw, 2004); and finally, ambidexterity might also be achieved through externalization, such as promoting exploration through venturing schemes (Michl, Gold, & Picot, 2013; Raisch, Birkinshaw, Probst, & Tushman, 2009; Rohrbeck, Döhler, & Arnold, 2009; Thorén, 2014).

For our research, we build on BMI and ambidexterity theory to build our analytic framework (see Figure 1). The framework is spanned by two dimensions: TI and BMI. As mentioned earlier, this distinction is discussed in the extant literature. In line with ambidexterity theory,

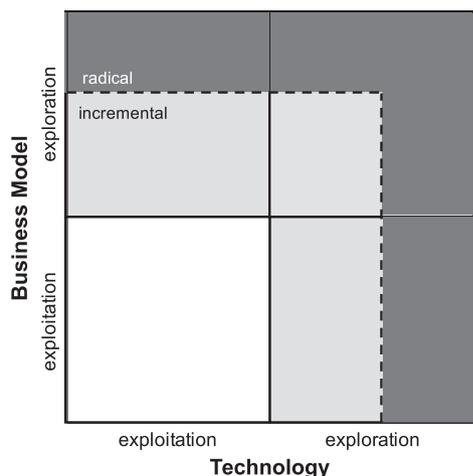


FIGURE 1 The double ambidexterity framework

each of these two dimensions is then divided into exploitation and exploration.

Regarding the TI dimension, we considered an organizational response to be placed in the exploitative technology category when it was closely related or included only minor adaptations to existing technology. Conversely, a TI that was explorative included a major change in the technology in terms of novelty for the firm or major investments in R&D.

Similarly, regarding the BMI dimension, we considered an organizational response to be exploitative if it consisted of fine tuning or a minor alteration in one or several of the business model's constituents (i.e., value capture, value creation, or value proposition). The final categorization can be found in the Appendix.

To capture even more nuances in our analytic framework, we introduced another subscale. We considered an explorative response, independently of whether it is a TI or BMI, to be incremental if it concerns an existing product, process, or service that has been significantly enhanced or upgraded. Conversely, we considered an explorative response, independently of whether it is a TI or BMI, to be radical if the product, process, or service had either unprecedented performance features or introduced such dramatic changes in features or cost that new application domains became possible (O'Connor & Rice, 2013).

An important detail is that we used incremental and radical for denoting actions (i.e., organizational responses), not outcomes. This is in line with Wheelwright and Clark's (1992) categorization of product development actions but contrasts with other studies that consider incremental and radical to be outcome related. It can be expected that the framework will map responses to market discontinuities (such as liberalization, competitive pressure, and changing regulatory frameworks) to BMI (Sosna et al., 2010) and responses to technological discontinuities to TI (Taylor & Helfat, 2009). However, there can also be comprehensive responses that combine TI and BMI (Chesbrough, 2010; Raisch et al., 2009).

3 | RESEARCH DESIGN

3.1 | Research strategy

To investigate the relationship between TI and BMI over time, we required an empirical setting in which: (i) we had more than two external discontinuities covering at least one market and technology discontinuities; (ii) we could observe and assess multiple organizational responses covering both TI and BMI; and (iii) we could study a focal firm that survives long enough to provide a longitudinal case (Eisenhardt, 1989).

We found this setting in the telecommunication industry, which in the past 20+ years has been affected by frequent market- and technology-side discontinuities (Rohrbeck, Hölzle, et al., 2009). The industry has passed through a number of major technological and market-side transformations such as liberalization of the state monopoly market, the introduction of mobile telephony, the Internet bubble, the introduction of smartphones (i.e., the introduction of Apple's iPhone), and the introduction of streamed services (i.e., Spotify and Netflix). During

the investigation period of 27 years, our focal firm has changed organizational form and has also both expanded to and withdrawn from geographic markets. Direct competitors, such as other Telcos, are easy to identify, yet they do not pose a major strategic threat. Instead, new entrants had a much greater impact on shifting the status quo in the industry, specifically over-the-top players (or OTTs) such as Skype, Spotify, Netflix, and Apple.

Furthermore, the use of an in-depth longitudinal case study was dictated by the need to track the development over time and the need to induce variance (Åhlström & Karlsson, 2009). As the main aim of the study was to explore how our focal firms used TI and/or BMI responses to survive and prosper when faced with strategic challenges, the study required sufficient variance in both external changes and responses. Using the three phases of disruptions as embedded cases further supported variance and the analysis by allowing for the contrasting of findings between them (Flyvbjerg, 2006; Yin, 2003).

3.2 | Data collection

The case study covered the period 1991–2017. The unit of analysis was organizational responses, i.e., critical events, which is in line with Åhlström and Karlsson's (2009) suggestion for longitudinal case studies. The list of critical events formed the basis for categorizing and studying organizational responses. Business model changes were investigated without describing the entire business model in detail at each stage. A similar approach has been used, for example, by Calia et al. (2007) and Björkdahl (2009).

Empirical material was obtained from multiple sources such as: (i) interviews with internal respondents inside TeliaSonera that had key positions in the different periods; (ii) interviews with external telecom experts; and (iii) secondary material such as annual reports, presentations, and industry white papers (see Table 1).

The respondents were chosen to cover the entire time period and to provide information on the key perspectives: technology (CTO Europe, corporate CTO), strategy (director corporate strategy, head of corporate strategy) and market (managing director of a new business). Findings were triangulated with interviews with two independent industry experts to confirm the major industry disruptions and to validate the organizational responses from an external and unbiased perspective. Twelve of the respondents were main informants who gave their interviews in order to develop the case descriptions. Four

respondents gave complementary information during the writing of the case in order to clarify specific details that remained unclear.

The main interviews, both for TeliaSonera respondents and the industrial experts, followed a semi-structured format: starting with background questions and then moving on to questions about the organizational response taken by TeliaSonera. Background questions were used to map the limits of the “knowledge sphere” of each respondent and covered the respondent's professional experience and tenure related to the telecom industry, i.e., what business areas and/or technologies s/he had been working in, what positions s/he had held, and how long s/he had been in TeliaSonera and the telecom industry, respectively.

The questions about organizational responses were posed as open questions. The respondents were asked to draw a timeline starting from the present day and backtracking events until the respondent had entered TeliaSonera. This approach can be compared with the critical incident techniques in which respondents are asked to recall critical events (Chell, 2004; Flanagan, 1954). Recall of critical incidents is considered to be valid, as it often contains important and emotionally engaging events, and it helps respondents remember the events in more detail (Chell, 2004; Kaulio, 2008). However, the weakness of this approach is that it alone does not guarantee comprehensiveness. By focusing on events, other organizational processes, such as processes that respondents consider to be routine, could be left out of the analysis. Triangulation through complementary interviews and secondary material was the primary method of counteracting this weakness.

Respondents were identified using two criteria: First, we wanted respondents who were “carriers-of-the-history,” meaning that they should have been within the organization for a long time and should have been engaged in central activities within the firm. Second, we aimed for complementarity, and thus we used a snowballing method (Biernacki & Waldorf, 1981) to contact respondents who worked in other parts of the organization or had another vantage point for other reasons.

Our secondary data consisted of annual reports, newspaper articles, internal presentations, and corporate training material. The last category was very useful as it dealt with the challenges the company wanted to communicate to its employees. As training in TeliaSonera was perceived as a component of a change process rather than personal development, the content of the major training programs

TABLE 1 Overview of used data

Phase	No. of interviews ^a	Secondary data	Total
Focus on network quality (1992–1998)	7	Financial reports	7
		Internal presentations	2
		Industry white papers	5
Value through convergence (1998–2007)	10	Financial reports	8
		Internal presentations	13
		Industry white papers	6
		Company training material (presentations, reports, etc.)	3
Partnering for speed and novel value propositions (2007 onwards)	12	Financial reports	9
		Internal presentations	6
		Industry white papers	4
		Company training material 2008–2017	12

^aTotal no. of interviews: 12 (some respondents were able to comment on multiple phases)

revealed many critical challenges. However, this material had a limited scope, as it only covered the period 2006–2017.

3.3 | Data analysis

The data was analyzed from three perspectives. First, we identified organizational responses. To identify the most significant responses, frequency of recall was used in combination with probing “why” questions that revealed arguments for the importance of initiatives. Second, in parallel with the identification of organizational responses, a timeline was composed after each interview. These timelines were aggregated continuously and complemented with new responses and verification of existing ones. Third, in order to look for patterns in the portfolios of the business model and technological innovations, individual responses were analyzed for categorization into phases.

A core issue in our analysis was how to define an organizational response. To be regarded as an organizational response, the event had to fulfill the following criteria:

- It had to be related to TI and/or a BMI.
- It had to be regarded as a strategic action in the sense that it had to have a competitive purpose, i.e., either to defend against emerging threats or to pursue an opportunity (cf. Saebi, Lien, & Foss, 2017).
- It had to be an action possible for competitors to perceive in order to exclude, e.g., internal performance programs.
- It had to include a decision that was difficult to reverse, at least without substantial costs in money or image.

The resulting timeline was discussed and refined through four iterations within the research group. Additional respondents were interviewed where gaps or inconsistencies in the data appeared. The timeline was also used to assess relationships between external events and organizational responses and to check for means-ends relationships. We also investigated the relationships between organizational responses and position and performance outcomes, providing us with the ability to link antecedents, organizational responses (BMI, TI), and outcomes.

3.4 | Data validation

Three measures were employed to increase reliability. First, we exposed all of our main respondents to the critical incident technique to ensure the completeness of the major events. Second, when combining events or dropping events from the “major events” status, it was always thoroughly discussed within the research team and, where appropriate, with respondents as well. Third, coding and interpreting was consistently done by teams of at least two researchers.

To increase validity, preliminary analysis results were discussed with the respondents, in particular with the industry experts. Both industry experts had a technical background, deep insights through both industry and academic affiliations, and more than 20 years of experience in the industry. Transcripts and field notes were frequently compared between the researchers. Finally, the research team had a favorable composition with two researchers who had more than 10 years of industry experience in Scandinavia and within the

telecommunication industry, and one researcher who had more than 10 years of experience in the German telecommunication industry. This allowed for deep insights into the focal company and a good overview of the European competitive landscape and the impact of the focal company's strategic moves.

4 | TIMELINE OF DISCONTINUITIES

In our process of identifying the discontinuities, three phases emerged. All respondents mentioned the launch of the iPhone as a major game changer in the industry. Several referred to events as occurring “pre or post the iPhone.” Accordingly, this was a major event that without a doubt could be regarded as the initiation of a new phase. The other starting point of a new phase was more difficult to demarcate precisely in time. The market liberalization was clearly disruptive and occurred from 1991 to 1993, but the respondents who lived through the liberalization period concurred that the disruption from liberalization only impacted TeliaSonera much later. The consensus among respondents was that the liberalization resulted in a competitive market with rivals that could not seriously challenge TeliaSonera until 1998. From 1998, the post-liberalization race was ongoing, and all Telcos changed their competitive strategy and entered the race toward mobile Internet technology. This disruption gradually continued well into the year 2000. The financial crisis was yet another milestone event; however, the respondents did not highlight this as sufficiently important. We hence conclude that the industry was affected by three phases of discontinuous change (see also Figure 2):

1. The first phase started with *liberalization* (from 1991 to 1993), which terminated the state monopoly and opened the markets to new competitors. This market-side discontinuity triggered the need for differentiation and cost-effectiveness.
2. The second phase (from 2000) started with a technological disruption in which the rotation-based (copper) networks were stated as being replaced by IP-based technology. This *technological convergence* provided important potential for cost reductions but also lowered the market entry barriers for over-the-top providers, such as Skype, which now could offer voice services without buying access to the core network. In this second phase, mobile telephony also started to grow rapidly, initiating a convergence of fixed and mobile networks of both voice and data services.
3. The third phase started with the introduction of the iPhone (from 2007). The emergence of smartphones led to an increasing migration of profits to the higher levels of the technology stack, i.e., from the operators of the core network to the device manufacturers and later to service and app providers. This *upward profit migration* continued with the introduction of the Apple App Store, which became a powerful platform for third-party developers introducing their value-adding services to the market. This discontinuity occurred on the technology side (new device and app-centric operating systems) and on the market side (shift of market power from the network operator to the device and service providers). Both effects combined placed the traditional Telcos under increasing commercial pressure (Henrich, 2014).

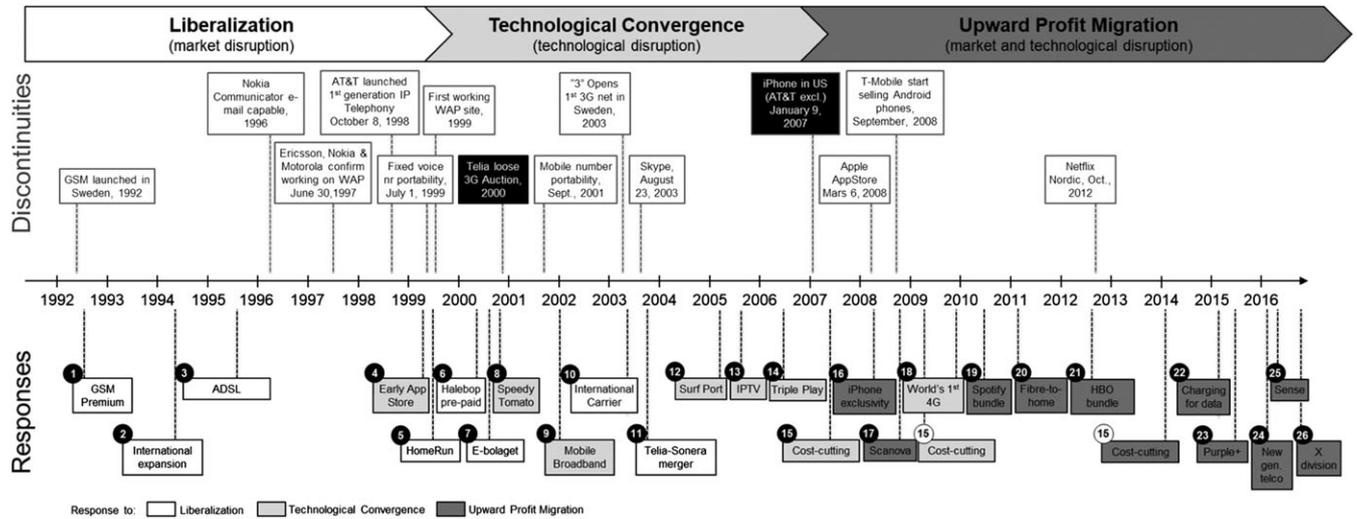


FIGURE 2 Timeline

Figure 2 provides a detailed overview of the different events that contributed to the three phases of discontinuity. The black-colored discontinuity events are the major milestones signifying phase shifts. The loss of the auction for the 3G licence represented the culmination of competitive pressure. At the same time, 3G was also the starting point for the rapid convergence of fixed and mobile networks of voice and data services.

5 | TIMELINE OF RESPONSES

Figure 2 also shows the timeline of TeliaSonera's strategic responses. In addition to position in time, we also classified the responses into three groups. The first group (white) included responses to liberalization and the associated competitive pressure. The second group (light grey) included responses to the technological convergence. The third group (dark grey) included responses to the upward profit migration. This grouping already showed that many responses occurred with a considerable time lag after the disruption. In the following, we will discuss the responses in detail.

5.1 | Responses to the liberalization of the industry (phase 1)

When GSM (Global System for Mobile communication) replaced the previous NMT (Nordic Mobile Telephony) analogue mobile network in the Nordic countries in 1992, it made mobile telephony accessible to the mainstream public. The NMT challenger "AB Företagstelefon i Stockholm," led by entrepreneur Jan Stenbeck, changed its name to Comviq and started offering GSM subscriptions at lower prices. In 1994, it even introduced a semi-free subscription called "Comviq Compis" ("Comviq Buddy" in English). A new entrant, Europolitan (acquired by Vodafone in 2002), added to the emerging price pressure, and it also competed with innovative value-added services. For instance, Europolitan introduced SMS and voicemail to the Swedish market. Comviq, on the other hand, introduced the market's first pre-paid card in 1997. In addition, the entrants had a regulatory advantage against TeliaSonera, as the fees for those entrants to terminate calls in

TeliaSonera's network were lower than the fees for TeliaSonera to terminate calls in its own network.

TeliaSonera's main response to this challenge was to compete with a premium offer with better coverage and customer support, while also attempting to minimize churn (customer defection) (response 1). Respondents reveal that it was also important not to have margins that were too high, as executives worried it would lead to further unfavorable regulations.

With the increasing coverage of rival competing networks, competition in the home market was intense for TeliaSonera. Another drawback came in September 2001 when a regulation enforced number portability for mobile subscriptions, thus lowering the switching costs for customers even further. The same year, TeliaSonera acquired all remaining shares of a mobile portal collaboration project with Oracle, called Halebob, which was later turned into a freestanding brand for mobile subscriptions in the lower cost bracket (R6).

After losing market share in Sweden, in 1994 TeliaSonera started buying stakes in both mobile and Internet operators in other countries (Baltic States and Eurasia (R2)). Many of the deals were unprofitable or otherwise unfavorable for the corporate portfolio, leading to an increasing geographic footprint and a shifting business portfolio.

Over time, mobile telephony started to cannibalize fixed voice revenues. More and more users have cancelled their fixed voice subscriptions with their high monthly fees and rely only on cellular connection. As of 2010, Swedish consumers have made more voice calls on cell phones than on fixed lines.

On the fixed network side, the Internet started to become mainstream in Scandinavia by the mid-1990s. The access to this new generic digital infrastructure led to large changes in the handling and transmission of information. The impact on business, science, and society in general has been enormous. The technology enabled new channels for business between businesses (B2B), between business and customers (B2C), and between customers and customers (C2C). Several spectacular ventures that exploited the new business models attracted large amounts of capital in the late 1990s. Some failed; however, more often it was investor expectations that were unrealistic or changed faster than the start-ups could build market positions.

Consequently, when financial markets became more strained, investors became unwilling to wait for profits, and the great “Internet Bubble” burst in 2001, sending shock waves through the global economy. New ways for individuals and businesses to collect, create, and distribute information prevailed, and e-business has had a steady growth ever since (much at the same pace as the pre-bubble predictions).

Several telecom companies and other types of firms became Internet service providers (ISP) to exploit the strong demand for fixed Internet access. TeliaSonera was pressured to allow other operators to use its infrastructure, particularly the copper access net, because it was considered a natural monopoly. Nevertheless, in ADSL and fibre technology, TeliaSonera was successful in incorporating fixed broadband services into its product portfolio and has had a steady market share of just below 40% ever since (R3). One early innovation that profited from this development was HomeRun, a service initiated in October 1999 that primarily allowed business people to connect to the Internet via WiFi with laptops and handheld devices at hotspots all over the country (R5). This service is still available today.

A number of freestanding broadband and dial-up Internet services were centralized in 2000 to a freestanding company called e-Bolaget (R7). In addition to the subscription services, the associated business development initiatives, such as portals and on-demand services, were gathered into the unit, which was given substantial freedom to try new business models and ways to operate. After approximately two and a half years, the unit was absorbed by the consumer segment division. Figure 3 illustrates the categorization of these responses and they can also be found in the Appendix.

5.2 | Responses to the technological convergence (phase 2)

Realizing that the company's traditional markets were so mature that there was little room for growth, TeliaSonera made a number of efforts to launch new services. From 1997 onwards, many services, such as video conferencing, virtual call centers, TV over the Internet (R13), and consumer Internet portals, were developed to generate more revenues from the fixed networks. Many of these services were later offered as bundles, also called triple play, as they combined fixed and mobile telephony with Internet Protocol television (IPTV) offerings (R14).

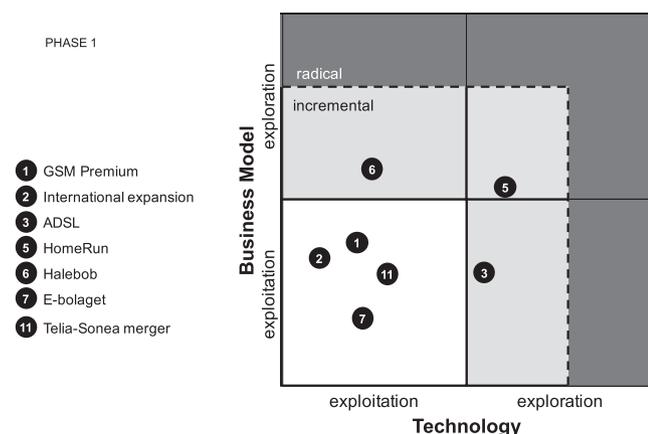


FIGURE 3 Portfolio of strategic responses to liberalization (1st phase)

With multiple networks available all over the world through acquisitions and investments in fiber, TeliaSonera established International Carrier in 2003 to offer B2B wholesale of telecommunications services and infrastructure (R10). International Carrier is a tier-1 network provider that, in 2014, became the second-largest carrier in the world.

The increasing connection of computers to adequate Internet services (i.e., the convergence of telecom and IT) propelled growth in all sectors of the digital industry. Some users started to take advantage of the IP protocol to connect voice calls with zero marginal cost all over the globe. However, when TeliaSonera was forced to open the copper access net for rivals, people could start using IP telephony with their regular phone, paying only for a local call regardless of where they called from. Firms such as Glocalnet and others thrived.

Skype launched its easy-to-use IP telephony PC client in 2003, with the advantage of simple search and contact organization functions and with free calls between computers all over the world. Despite inferior quality and unreliability, IP telephony delivered a hard blow to the telecom business; it took important long-distance revenues away from the fixed-network operators, substantially lowering their margins. Analysis firm Ovum estimates that the industry lost US \$386 billion in revenues between 2012 and 2016 due to Skype, Lync, and other Voice over Internet Protocol (VOIP) services (Henrich, 2014).

With price pressure on both fixed and mobile voice services, Telia merged in 2003 after long negotiations with the Finnish ex-monopolist Sonera (R11). CEO Anders Igel was given the difficult task of realizing the synergies of the two large companies, which involved much internal friction and massive downsizing. However, the merger also brought a wider set of international activities into the corporate portfolio due to Sonera's stakes in the East together with Turkcell. These became the main area for business growth for some time, primarily by providing mobile voice services in Eurasia.

On the mobile side, the GSM networks, at the end of the century, made it possible to transmit digital signals, allowing for the transfer of data. This function was incorporated in cell phones, referred to as WAP services. Many of the early WAP phones were rather complex. Handset competition was primarily based on smaller size and longer battery life, and Nokia emerged as the market leader. The operators' prevalent business model was a subsidized handset with lock-in subscriptions and complicated price structures. For WAP, TeliaSonera had an early version of an app store with approximately 80 applications (R4). It required a special premium subscription called “Department of the Future,” or DoF. App development at this time was a closed activity controlled by few actors. With low bandwidth, a limited range of apps, and low user friendliness, WAP's success was limited. However, the basic digital infrastructure and the idea of freestanding downloadable applications had been established.

The first technology that was called “broadband” on mobile devices was 3G, which was launched in 2002 (R9). With a download speed up to 40 times faster than GSM, it became possible to use the Web, to download music, and to use social media apps on the phone. 3G also led to a large increase in broadband connectivity for computers, both laptops and stationary PCs, as several operators aggressively promoted it as a fixed connection substitute. The networks became quite congested after a few years due to the large

number of simultaneous connections, making them sometimes barely accessible.

The technology shifts to 3G did not start well for TeliaSonera. When the 3G spectrum licences were allocated in 2000, the regulator awarded them to Europolitan, Hi3G, Orange, and Tele2; and TeliaSonera was left without a licence. This was somewhat of a shock to the executives at the incumbent former monopolist, whose leadership in telecom had been taken for granted. "It was a real awakening. A shock almost. And it led to a noticeable change in attitudes. And we had to realize that we were just a company like all the others," the head of corporate strategy reported. Fortunately, entrepreneur Jan Stenbeck approached TeliaSonera and offered to share the licence he acquired for Netcom. They built a successful joint network together.

In order to handle the new mobile Internet capabilities and profit from them, TeliaSonera invested heavily in achieving an early solid position. The strategic logic was to acquire a critical mass of users so that other businesses would benefit from buying traffic from them through TeliaSonera rather than attracting it on their own (Paulsen, 2000). To attract and redirect users, the portal business model was borrowed from the fixed Internet. The most notable initiative was Speedy Tomato, a heavily marketed WAP portal in which SEK2 billion were invested (R8). Speedy Tomato was the pan-European portal brand corresponding to Halebop in Sweden. The spectacular launch and subsequent lack of success made this initiative a well-known failure in the Internet community and beyond. A later attempt, Surf Port was launched in 2005 and, being more mature, had greater success (R12). This was the first mobile portal to be propelled in all TeliaSonera's main markets: Scandinavia, the Baltic States, and Spain. The technology enabled users to access both the regular WWW and WAP, which, up until that point, had been practically two separate Internets.

TeliaSonera had a different strategy for the launch of 4G: rather than being passive, it took the initiative and was the first operator in the world to open 4G networks, which happened simultaneously in Norway (in collaboration with Huawei) and in Sweden (in collaboration with Ericsson) (R18). Promising 100 MB/sec for mobile users and 1 GB/sec for stationary users as the top possible speeds, 4G offered substantial improvements in performance. As the 4G systems only provided a packet-based infrastructure, all their voice communication was made through IP telephony. The Swedish licences were awarded to TeliaSonera, Hi3G, Intel Capital Cooperation, Tele2, and Telenor in 2008; the first consumer usable networks became accessible in December 2009. Figure 4 illustrates the categorization of these responses and they can also be found in the Appendix.

5.3 | Responses to the upward profit migration (phase 3)

The launch of Apple's iPhone in 2007 marked the start of the convenient use of the Internet on handheld devices. User-friendly browsers, services, and apps became available. The first version arrived in Sweden in 2008: the iPhone 3G. This completely changed the device industry by successfully combining elegant design, a user-friendly interface, and a well-functioning touch screen (which companies such as Neonode, Palm, and Nokia had previously attempted). From 2008,

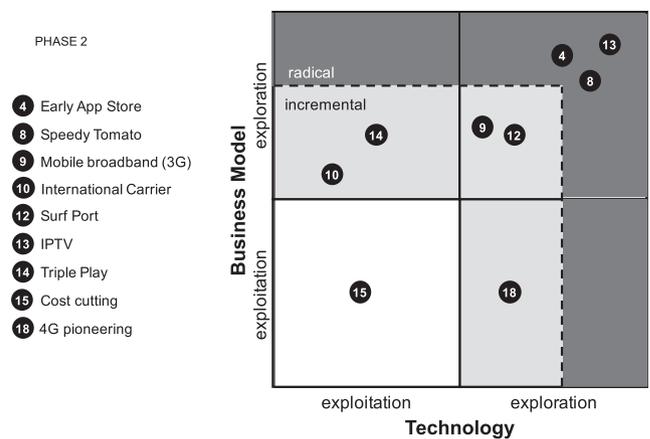


FIGURE 4 Portfolio of strategic responses to the technological convergence (1st phase)

the Apple app store allowed users to customize their device by downloading apps that offered a wide range of functions. Apple's app store, which was first only accessible to developers, quickly accumulated hundreds of thousands of applications, many harboring a creativity that had never been seen before.

First, Google and later Microsoft, launched their own smartphone operating systems, with Google's Android emerging as the global leader (but not yet in Sweden, where iOS is still the leading platform). Smartphones and their larger cousin, tablets, changed the power balance in the industry, taking the control and revenue of services out of the hands of operators while leaving them with the responsibility for network connectivity, which was rapidly becoming commoditized and giving diminishing returns.

TeliaSonera had negotiated exclusive rights for iPhone 3G in Sweden (R16) and was selling the iPhone at prices ranging between SEK8,000 and 21,500 depending on the model, lock-in time, and subscription (Lindkvist, 2014). The director of corporate strategy commented: "We were quick to sign for exclusivity, because we could see what the users wanted. It was mostly for tactical reasons; in addition to sales, we sought to strengthen the brand and lower the churn." However, the combination of a lack of their own high-value services and the increasing demand for capital-expenditure-hungry bandwidth extensions caused operators to face a widening "revenue gap" (Markendahl, Mäkitalo, Werding, & Mölleryd, 2009). For instance, the profit of TeliaSonera's broadband division decreased by an average of 1 billion SEK per year after 2010. The combined economic pressure on TeliaSonera's Nordic businesses led to major cost-cutting initiatives in 2007, 2009, and 2014 (R15). And in 2008, the access network was finally implemented in a separate infrastructure company, Scanova, because the regulator demanded access equality (R17).

While the former CEO of TeliaSonera, Anders Igel, was rather reluctant to expand the company at the expense of profitability, his successor Lars Nyberg had a stronger growth mandate from the board. Anticipating the major transformation toward digital business and a merger in the use of fixed and mobile Internet, TeliaSonera initiated negotiations and the development of a combined technology and business development training program with KTH Professional Education in 2006. As of 2007, the program has brought key internal people from

all over the world to Stockholm for intense training. This has supported a much-needed competence and culture shift toward stronger business and customer orientation and away from the old institutional thinking of the monopoly days.

The long stretch of cost-saving efforts and rationalizations continued. In 2009, two-thirds of the company's original headcount had been eliminated. Unions criticized top management for trying to polish financial indicators with the hope of attracting a buyer, rather than developing promising mid- to long-term business development programs and strategies (Göteborgs Posten, 2008).

Another driver of capacity demand was the emerging streaming services, most notably Spotify (in 2006) and Netflix (in Sweden in 2012). Instead of locally downloading and storing data, streaming now involves customers downloading content for single consumption. When Netflix launched in Sweden, TeliaSonera's fixed network traffic almost doubled overnight. This surge also spilled over onto the mobile side, where many customers started to stream video on their handheld terminals, using this "second screen" as a first screen.

When Lars Nyberg replaced Anders Igel as TeliaSonera's CEO, there was the hope of rekindling growth in Scandinavia. However, the constant cost cutting continued and was joined by corporate focus areas such as "quality of service" and "world-class networks." These are typical defensive differentiators at the end of a technology cycle. The resulting sentiment was unfavorable for innovation and the taking of risks. Some improvement came gradually and were further supported by Johan Dennelind's leadership, which began in 2013.

TeliaSonera changed its business development strategy in the streaming context by partnering with leading actors rather than building proprietary solutions from scratch. In 2010, it launched a partnership with Spotify (R19) and with HBO Nordic in 2012 (R21). These music and video services were bundled with broadband subscriptions to differentiate them from low-price competitors while also giving partners access to a larger customer base. TeliaSonera deepened its commitment to Spotify in 2015 by buying a 1.4% share of the company. The chief technology officer (CTO) in Europe explained: "We were early to form these partnerships in Sweden. It was a proactive way to get a foot in the media consumption trend. We also saw that the mobile was becoming the epicentre for the individual."

An innovation initiative called "Purple plus" was launched in 2015 to further support innovation and growth, and even more innovation training initiatives were offered to managers (R23). Additional efforts were made at the end of 2015 and 2016 to stimulate innovation. The company-wide initiative New Generation Telco was an attempt to foster a positive sense of the future while supporting a constructive culture with a focus on growth following cost cutting and reorganization (R24). In 2016, a separate unit, "X division," was formed in which entrepreneurial initiatives could be hosted and could benefit from a supportive environment and start-up-appropriate management practices (R26). Recent new services include Sense, a subscription and hardware package that enables cars built after 2001 to connect to the Internet. In addition to giving the car a WiFi network, it also equips it with a number of useful control and support functions (R25). Again, the initiative is built upon partnerships with other companies, rather than doing everything in-house. Figure 5

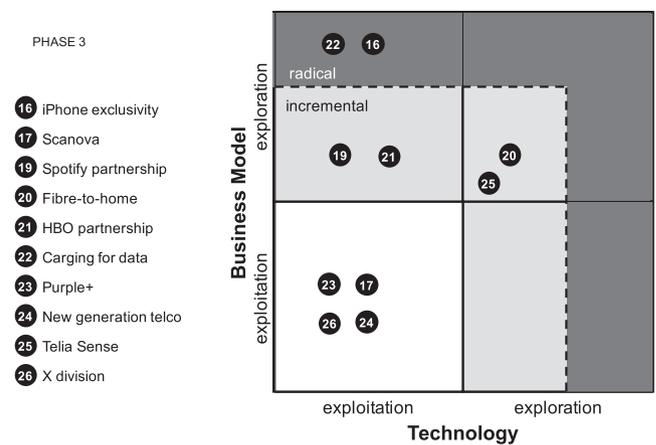


FIGURE 5 Portfolio of strategic responses to upward profit migration

illustrates the categorization of these responses and they can also be found in the Appendix.

6 | DISCUSSION AND CONCLUSION

This study aimed to contribute to the BMI literature along three axes: (1) to uncover patterns in the interplay between BMI and TI over time; (2) to identify antecedents and outcomes of BMI (with or without TI); and (3) to investigate the relationship between antecedents, organizational response (TI/BMI), and performance outcomes.

It should first be noted that a longitudinal case study cannot conclusively prove relationships. The aim, therefore, was to identify patterns and to compare these with the claims of existing theory and thus contribute to the development of new theory. The first noteworthy finding was that our focal firm was able to produce a high number ($n = 26$) of organizational responses, which contrasts with the inertia predicted by theory (March, 1991; Tushman & O'Reilly, 1996). In addition, the majority of them were combinations of TI and BMI, which supports propositions that it is particularly important to study the interplay between the two and may also be particularly interesting for practice—as highlighted in the two most recent literature analyses on business model research (Foss & Saebi, 2017; Wirtz et al., 2016).

Another interesting finding is revealed in Figure 6. By coloring the areas in which the majority of organizational responses occurred, the appetite for risk taking, approximated by the degree of radicalness in exploration, appears to follow a U-shape over time. In phase 1 (liberalization), the responses are "close to home," i.e., mostly exploitative or, to a low degree, incrementally explorative. Phase 2 (technological disruption) demonstrates an almost opposite trend to phase 1, and TeliaSonera aggressively ventures into the most challenging double ambidexterity quadrant, where both the business model and the core technology are radically new. The results were mixed. For example, the early app store was ahead of its time, as it was a pioneer of the smartphone in all dimensions. But the lack of openness toward third-party developers, the high price, and the lack of a user-friendly interface led to commercial failure. Other responses were temporary successes, such as the IPTV business. For a short period, TeliaSonera was Sweden's largest video rental agency, but it eventually lost out

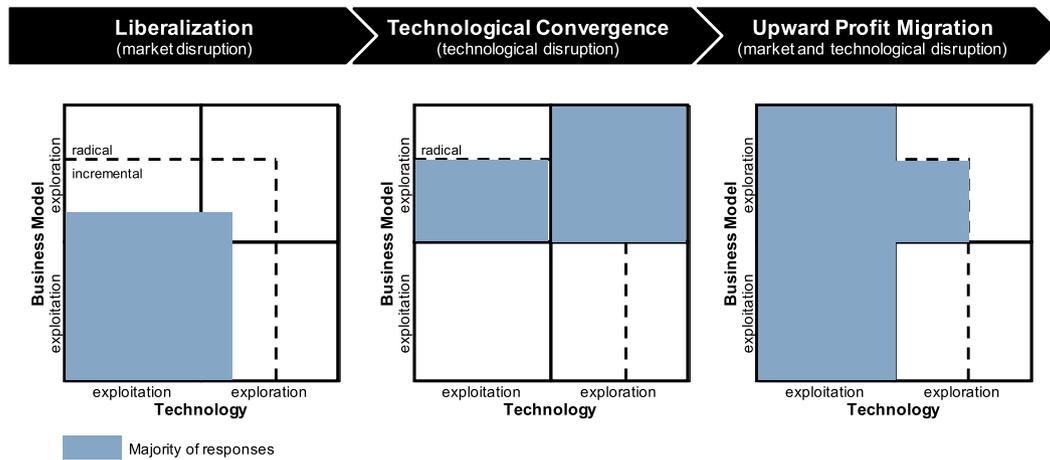


FIGURE 6 Nature of responses in the three phases [Colour figure can be viewed at wileyonlinelibrary.com]

to Netflix and HBO. In phase 3 (upward profit migration), the adventurousness seems to decline, and the responses are either purely BMIs or responses that build on partnering.

We attribute this U-shape tentatively to a learning pattern. Respondents confirmed that, in particular, the technological disruption in the second phase, combined with the appearance of strong new entrants, led to a feeling of radical challenges requiring radical responses. These organizational responses had mixed success, which may be partly why the third phase organizational responses exhibit a more measured strategic behavior. This indication of learning gives rise to the hope that organizational adaptation, when challenged by external disruptions, can be learned (March, 1991; Miles, Snow, Meyer, & Coleman, 1978; Teece, 2010).

In addition, in this third phase, the case firm became increasingly willing to open up its innovation activities, with partnering being the preferred open-innovation instrument. During the first phase, TeliaSonera typically designed and developed everything in-house, often in close collaboration with equipment manufacturers such as Ericsson and Nokia. The loss of the 3G licence auction and the harsh terms dictated by Apple when the iPhone was introduced could in retrospect be considered as more or less forced partnerships. However, both of these partnerships turned out to be successful, and they thereby challenged the existing tradition of in-house value creation. Consequently, the third phase includes a number of partnerships, with Spotify and HBO being the most notable ones. This pattern suggests that the BMI practices shifted the focus of competitive strategy from single-source supply-side competitive advantage to combined demand- and supply-side competitive advantage, as suggested by Massa et al. (2016).

This relates to the second research aim, where evidence suggests that BMI is dependent on external pressure from market and/or technology disruptions. In addition, the nature of BMI practices seems to be informed by learnings from earlier experiences. Here it is also noteworthy that a Telco would see itself as a market-driven company, operating technology developed by vendors such as Ericsson and Nokia. This is interesting because, in the mature stage, our focal firm has stopped its exploratory technology responses, preferring exploration through BMI. For technology-driven companies, this might be the opposite.

In the analysis, the outcome dimension is dominated by survival and can be compared to other European Telcos' good financial health. We were not able to draw conclusions about causality in relation to TI/BMI and performance outcomes. However, the portfolio of organizational responses is collectively comprehensive and powerful in terms of securing a strong position in the industry. Some individual responses, such as investing in fibre-to-the-home and partnering with streaming service providers (Spotify, HBO) has been judged both internally and externally to be strong drivers of firm performance.

Regarding the third research aim, evidence shows that organizational responses often relied on combinations of BMI/TI. Surviving discontinuous developments with the maintenance of firm performance therefore appears to require mastering of both TI and BMI. This paired ability can be conceptualized and studied with the "double ambidexterity matrix." This matrix can potentially support practitioners by introducing nuances into the planning, executing, and ultimately profit-making of TI and BMI.

The learning effects, which in TeliaSonera led to the U-shaped level of radicalness of organizational response over time, may also result in increased proficiency of double ambidexterity. In this case, the focal firm would be able to exercise double ambidexterity in a more mature way in the future, which could allow it to employ even more radical and sophisticated responses, thereby further strengthening its competitiveness (Achtenhagen et al., 2013; Foss & Saebi, 2017).

The case also has some implications for BMI research. First, a common (popular) understanding is that BMI is a phenomenon with very short temporal distribution. In our case, we argue that BMI, like all innovation processes, is a diffusion process that takes time to implement. In some cases, such as the launch of the iPhone, it is almost instantaneous; however, in other cases, it is stretched out over several years. Accordingly, to investigate BMI, we need to apply longitudinal approaches and include the contextual setting.

As a third key finding, the study corroborates the important role of trial-and-error learning and the maintenance of portfolios of business models (Foss & Saebi, 2017; Rohrbeck, Konnertz, & Knab, 2013). This confirms the point made by Sabatier, Mangematin, and Rousselle (2010) that firms may need to operate several different business models in parallel. Even though some of TeliaSonera's BMIs and TIs

failed, the portfolio of double ambidexterity responses collectively ensured survival and new sources of revenue.

Despite interesting findings, the use of a single context and umbrella case limits the case's ability to provide normative guidelines. However, the refined perspective on double ambidexterity can hopefully contribute to further research that provides an even better understanding of how firms may systematically adapt to environmental change.

For further research, two research questions appear to be particularly essential: (1) How can double ambidexterity be learned? and (2) How can firms match disruptions and discontinuous changes of different types with effective response patterns?

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APPENDIX

Discontinuities	Response					
	No.	Name	Business model change ^a			Technology change
Liberalization	1	GSM premium	Exploitation		Exploitation	
Liberalization	2	International expansion	Exploitation		Exploitation	
Liberalization	3	ADSL	Exploitation		Exploration (incremental)	Infrastructure upgrade and new hardware, such as modems, needed
Technology convergence	4	Early App Store	Exploration (radical)	VP: Customize handset functionality VCr: Secure compatibility, providing download platform, back office VCa: Subscription, pay per use	Exploration (radical)	Apps and app store enable customization of handheld functionality
Liberalization	5	HomeRun	Exploration (incremental)	VP: Remote access VCr: WLAN and partnerships VCa: Pay per use, weekly subscription	Exploration (incremental)	WiFi in new context. Backbone connection. Security
Liberalization	6	Halebop	Exploration (incremental)	VP: Low-price mobile VCa: Pre-paid	Exploitation	
Liberalization	7	E-bolaget	Exploitation		Exploitation	
Technology convergence	8	Speedy Tomato	Exploration (radical)	VP: Online mobile portal, access wide range of services VCr: Integration of services, UX design, capabilities VCa: Advertising	Exploration (radical)	WAB-based portal with services through IP
Technology convergence	9	Mobile broadband (3G)	Exploration (incremental)	VCr: Partnering for new network, incl. base stations and backbone	Exploration (incremental)	New base stations, phones, and standards
Technology convergence	10	International Carrier	Exploration (incremental)	VP: Global wholesale of IP capacity VCr: Separate organization with global network assets VCa: Selling IT capacity in bulk B2B	Exploitation	
Liberalization	11	Telia-Sonera merger	Exploitation		Exploitation	
Technology convergence	12	Surf Port	Exploration (incremental)	VP: Online mobile portal	Exploration (incremental)	Integration of WAP and WWW
Technology convergence	13	IPTV	Exploration (radical)	VP: Streaming movies on demand VCr: Media rights, storage, software VCa: Rental revenue model	Exploration (radical)	New technology is needed at Telia and for the customer
Technology convergence	14	Triple play	Exploration (incremental)	VP: Simplification (bundling, package price, one invoice) VCr: Integrate systems	Exploitation	
Technology convergence	15	Cost cutting	Exploitation		Exploitation	
Upward profit migration	16	iPhone exclusivity	Exploration (radical)	VP: First smartphone VCr: Partnering for exclusivity	Exploitation	
Upward profit migration	17	Scanova	Exploitation		Exploitation	
Technology convergence	18	4G pioneering	Exploitation	VCr: New base stations and backbone	Exploration (incremental)	New base stations, phones, and standards
Upward profit migration	19	Spotify partnership	Exploration (incremental)	VP: Music streaming VCr: Partnering instead of building own solution VCa: "Drug dealer" business model	Exploitation	

(Continues)

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Discontinuities	Response					
	No.	Name		Business model change ^a		Technology change
Technology convergence	20	Fibre-to-home	Exploration (incremental)	VCa: Customer pays installation cost	Exploration (incremental)	Changes in the distribution net work, new modems
Upward profit migration	21	HBO partnership	Exploration (incremental)	VP: Video streaming VCr: Partnering instead of building own solution VCa: "Drug dealer" business model	Exploitation	
Upward profit migration	22	Charging for data	Exploration (radical)	VP: Free calls/SMS, pay for data use VCa: New pricing model	Exploitation	
Upward profit migration	23	Purple+	Exploitation		Exploitation	
Upward profit migration	24	New generation Telco	Exploitation		Exploitation	
Upward profit migration	25	Telia Sense	Exploration (incremental)	CP: Connect the car CRr: IoT-based service VCa: Installation price plus subscription	Exploration (incremental)	Integration in car systems
Upward profit migration	26	X division	Exploitation		Exploitation	

^aChange in Business Model: VP = value proposition, VCr = value creation VCa = value capture