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FIGURE 1

A conceptual model of incumbents' strategic response to digital innovation

		SOURCE INDUSTRY OF DISRUPTION	
NATURE OF IMPACT		**Within industry**	**Outside industry**
	Radical innovation	Creation of new market needs	New market creation
	Incremental innovation	Imitation	New ways of solving existing needs

Archetypes of incumbents' strategic responses to digital innovation

Digital technologies (DTs) are significantly changing industrial and organisational activities, as well as the underlying processes and competencies. These impacts are particularly relevant when referring to firms' business models, in particular on how incumbents have struggled to innovate their business model to react to the disruption triggered by DTs. These technologies have posed new challenges that seem to differ from those going along with previous technological shifts. We argue that such challenges depend on the incremental or radical nature of the technology at stake, as well as how far this is from the technological path of the incumbent, focal firm. By investigating how incumbents are adapting their business models in response to the disruption triggered by DTs, this paper proposes a conceptual matrix that draws on two dimensions: (i) the extent to which the impact of the digital technology is incremental or radical; and (ii) whether the industry of origin of the digital technology is the same or a different one from the focal firm. Through four illustrative case studies, we discuss different strategic approaches, highlighting how incumbents may mobilise different resources and assets following a more defensive or proactive posture in adapting their business model to the digital transformation.

Keywords: digital innovation; business model innovation; incumbents; incremental and radical innovation; strategic response

1. Introduction

This paper explores how incumbents adapt their business models when dealing with a digital innovation the impact of which is either incremental or radical and that may come from either their own industry or indeed other industries. Digital technologies (DTs hereafter) have disrupted companies for over a decade, driving changes of industrial and organisational activities, as well as of the underlying processes, competencies, and intellectual capital strategies (Rindfleisch et al., 2017; Nickerson, 1997). Despite the breadth of DTs, one of the main challenges rests on exploring how these technologies are transforming organisations. Firms are facing strong competition from direct competitors who may opt for a low-cost strategy or competitors from other sectors that rely on new or different technologies and/or business models (Markides, 2015; Teece, 2010; Tongur and Engwall, 2014).

Traditionally, firms tend to either converge towards the disruptor by providing low-cost or technologically-advanced products and services or diverge from the competition by trying to create more or better value for their customers, for instance by providing additional services (Cusumano et al., 2015; Saebi et al., 2017). However, DTs are not only encouraging firms to experiment *with* the technology different pathways for value creation, but can also facilitate firms' efforts to experiment *around* the technology, in order to shape the role that the various actors along the value network play in influencing the commercialisation of an innovation (Chesbrough and Rosenbloom, 2002). Because these changes are often invisible to the outside world, changing the business model can bring advantages that are hard to copy (Girotra and Netessine, 2014), which often results in firms redesigning their strategies. In particular, we argue that the firm's intellectual capital can be instrumental to the generation of new value (Sullivan 1999) or the processes of running new businesses (Nickerson, 1997); therefore, firms' effort to tackle digital disruption may as well entail a redefinition of their

knowledge management strategies (Buenechea-Elberdin et al., 2018; Cabrilo and Dahms, 2018).

This research takes on a strategic perspective to examine the impact of digital innovation on business models. A business model is hereby conceived as the set of choices made by firms to create value via customer engagement and appropriate the subsequent outcomes (Zott et al., 2011). Because it describes the way firms organise their business, it is inherently subject to change over time and in different directions (Amit and Zott, 2001). We focus our research on incumbents in order to explore how firms mobilise their *existing* resources, capabilities, and intellectual capital, altering their business models, to handle external competitive forces of different nature. In order to do so, we propose a conceptual matrix that characterises digital innovation along two dimensions: the extent to which the impact of the digital technology is incremental or radical and whether the industry of origin of the digital technology is the same or a different one from the focal firm. The former dimension is indicative of the extent to which the firm has to incrementally or radically adapt its internal resources and capabilities in response to the given DT (Christensen, 2002). The latter dimension is indicative of the nature of the competition (direct vs. indirect) and of the distance between the new DT and the technological path of the focal firm, providing further insight on the firms' adaptation process (Snihur and Zott, 2013). We complement the above theoretical development with illustrative examples of four multinational incumbents that operate in different sectors and are known for their forefront approach to embracing digital technological innovation. We propose four archetypes of strategic responses depending on the nature of the innovation – incremental vs. radical - underpinning a given digital technology. By drawing attention to this interplay between the nature of (digital) innovation and firms' strategic decision about how to innovate their business model, we maintain that our results contribute ongoing debates within the business model scholarship by bridging the

gap between what we understand the impact of digital technologies being and the broader strategic remit of firms.

The rest of the paper is organised as follows. In Section 2, we review the main literature on DTs, on the dynamics of business model innovation, and on the incumbents' response to technological innovation. In Section3, we present a series of archetypes of firms' responses to digital innovation through four illustrative case studies. Finally, Section 4 illustrates the main implications, limitations of our work, and avenues for future research.

2. Theoretical background

In this section, we review the main literature on digital technologies and their impact on business models. In particular, we discuss prior works on incumbents' response to different types of technological innovation.

2.1 Digital technologies and the dynamics of business model innovation

The disruptive effect of DTs on firms' processes and competencies (see Petzold et al., 2019, for a literature review on disruptive innovation) as well as the changes that these technologies drive on industrial and organisational activities have recently received growing academic interests. DTs include a vast set of technologies, such as the Internet of Things, Additive Manufacturing, Big Data, Artificial Intelligence, Cloud Computing, Augmented and Virtual Reality, and Blockchain, among others (Rindfleisch et al., 2017). However, despite the existence of many DTs along with confusing, and perhaps evocative, jargons, the main challenge rests on exploring the transformations that these technologies are posing to organisations. Indeed, taken individually these technologies bring forward complex transformational forces for firms, but when combined their effect is unique and disruptive (Teece, 2018; Nelson, 2018).

Scholarly attention has been addressed towards the exploration of the effect of DTs on the development of new business models or the changes introduced in existing ones (Spieth et al., 2014; Li, 2018). For instance, with a focus on how DTs can facilitate service transformation, Ardolino et al. (2018) identified a set of digital capabilities and discussed how these may support manufacturers' trajectory of growth (Neu and Brown, 2005; Coreynen et al., 2017). It has also been argued that DTs can transform the structure of supply chain (Vendrell-Herrero et al., 2016), reshaping industry competition. Likewise, the relationship a firm has with its products - and with its customers - is becoming continuous and open-ended (Porter and Heppelmann, 2014). Certainly, nowadays we have observed a variety of new business model patterns based on the exploitation of DTs, including big data-centred, platform-based, sharing-based, makerspaces, and enhanced-experience business models. Among many, the following are some examples: Netflix uses data as a key resource to automatically profile customers and prompt them with a specific movie gallery (Panniello et al., 2016); Amazon has extended its business model by offering cloud-computing services to new segments of customers; Michelin uses IoT solutions that enable truck fleet managers to reduce fuel consumption and costs by allowing them to pay for tires depending on the distance covered. Thereby, it clearly emerges how the actual scenario is characterised by a deep transformation of business models, the innovation of which is in most of the case driven by DTs.

Digital transformation is posing new challenges that seem to differ from those going along with previous technological shifts (Zott and Amit, 2017). New firms are in fact occupying relevant positions within the market in a very short time. For example, this is the case of Facebook that was founded in 2004 and was generating revenues of US$19 billion by 2015, or Airbnb that was founded in 2008 and was soon nearing revenues of US$1 billion in 2015. Nevertheless, while a number of start-ups are going across a new old gold, several

incumbents are in a critical situation, as revealed by the variety of traditional businesses that are experiencing hard times and fighting to survive. This is largely due to the way DTs are deeply changing our way of living, making obsolete not only products or services, but also how firms organise their business processes along with how they create and capture value. Thereby, reinventing business model is becoming mandatory for incumbents in the attempt to survive in the changing digital world.

Extant academic research exploring business model change and technology strategy has emphasised the importance of achieving a more precise appreciation of how innovation links to performance through the business model (Chesbrough and Rosenbloom, 2002; Chesbrough, 2010; Baden-Fuller and Haefliger, 2013). Exploring firms' response to technological change is inherently connected with an understanding of how they leverage the strategic function of their business model (Baden-Fuller and Morgan, 2010; Casadesus-Masanell and Ricart, 2010; Casadesus-Masanell and Zhu, 2013; Gambardella and McGahan, 2010; Lecocq et al., 2010; Plé et al., 2010; Teece, 2010). Therefore, the focus has shifted from conceptualising, characterising, and explaining business models at a given point in time towards developing a more dynamic view that captures the process of firms' business model innovation (Saebi et al., 2017), which also includes those processes of adaptation whereby *"management actively aligns the firm's business model to a changing environment, for example, changes in the preferences of customers, supplier bargaining power, technological changes, competition, etc."* (2017:569). In this research, we convene with Amit and Zott (2001) and approach business model from a system perspective to explain how firms' processes of value creation and value capture are articulated (Casadesus-Masanell and Ricart, 2010; Plé et al., 2010; Zott et al., 2011). In exploring the relationship between innovation and business models, scholars have recognised that different innovations may require different organisational adjustments and result in a multitude of competitive impacts

(Bughin and Van Zeebroeck, 2017). The critical challenge for a company facing a change in technology is overcoming the change as such, while simultaneously crafting a business model that matches the unknown competitive context after the shift (Tongur and Engwall, 2014). This challenge is critical also because changing the business model often results in firms redesigning their strategies, including knowledge management strategies. In some cases the intellectual capital itself, defined as the sum of all the intangible values of a business (Brooking, 1997), can be used to generate value (Sullivan 1999) or run new businesses (Nickerson, 1997). In addition, it has been demonstrated that intellectual capital is positively related to venture performance for start-up firms (Peña, 2002). As a result, it was studied how reconfiguring the knowledge management strategy for innovating the firm's business model (Hussi, 2004; Cabrilo and Dahms, 2018; McConnachie, 1997; Buenechea-Elberdin et al., 2018). Liang et al. (2013) also studied the opposite relation, which is how different business models affect intellectual capital.

Business model is not a static concept: since describing the way firms organise their business, it is inherently subject to change over time. The case of Xerox and its inability to find the right business models for the multiple technologies that were being developed in-house teaches us how a company has at least as much value to gain from developing an innovative new business model as from developing an innovative new technology (Chesbrough, 2010). Much work has been done on the effects of DTs on the development of new business models or on the changes introduced in existing ones. Scholars have also recognised that different innovations require different organisational changes. However, nobody has still proposed a clear connection between specific types of innovations and the corresponding changes in the business model.

2.2 Types of firms and nature of innovation

In order to study how firms adapt their business models in response to the disruption brought about by digital technologies, it is important to distinguish between incumbents and new entrant firms. In fact, as argued by Adner (2002), the response of incumbents to technological innovation is different with respect to new entrants primarily because these latter may be subject to inertia**.** Incumbents are resource dependent (Pfeffer and Salancik, 1978) on their most demanding customers and tend to focus their investments towards innovation that are valued by their mainstream customers Christensen (1997). In contrast, new entrants cannot rely on an existing customer base and, whilst they are subject to no constrain, they are also forced to identify the new features offered by the new technology (Adner, 2002). However, inertia in the face of disruption can also derive from other sources such as rigidity of existing routines and competences (Gilbert, 2005) or institutional resistance towards change (Markides, 2006). In general, there is limited empirical evidence of how companies adapt their models (Foss and Saebi, 2017) and accomplish this modification in the face of innovations that may have a disruptive effect (Cozzolino et al., 2018). We focus on incumbents because this will enable us to explore how firms decide about which resources and capabilities to mobilise in order to handle the disruption.

Incumbents' strategic response to market dynamics has already received the attention of business model scholars. As operationalised by Christensen et al. (2005), incumbents may opt for different alternatives, that is: *cede* market segments to the new entrant and focus on the more profitable customers; *cram* the new technology into their existing business model, which is highly unlikely to succeed; *co-opt for growth*, by targeting the customers of the new entrant with a scaled down version of their core product; *co-opt for survival*, by bringing the new technology or business model into the lower-end of the existing customer base and try to increase entry barriers around core segments. While the exploration of incumbents' strategic response to technological disruption is not new (see for instance Kim and Min,

2015), extant research suggests that the link between these two concepts and the complexity associated with this link deserves further attention (Kaulio et al., 2016). Osiyevskyy and Dewald (2015) have conceptualised incumbents' response to disruptive innovation by relying on the two generic strategies of exploration and exploitation (i.e., explorative adoption of a disruptive business model vs. exploitative strengthening of the existing business model). Their study brought to light how firms do not entirely give up their existing business model; instead, they keep defending their habitual routines. Our research complements extant contributions by exploring incumbents' innovation of their business models in response to digital innovation, which has evidenced triggering value capture and appropriation processes that are different from market expectations. Despite this wide interest in understanding the business implications of DTs, and notwithstanding the flourishing literature on connectivity, smart technologies, and digitalisation more generally, how incumbents are tackling such a disruption still leaves ample room for debate (Bughin and Van Zeebroeck, 2017).

Firms' response to changes in the external environment is a common focus of academic research exploring how innovation impact on firm performance (Benner and Tushman, 2002; Jansen et al., 2006; Aversa and Guillotin, 2018). Innovation efforts can be incremental or radical depending on the extent of technological advance compared to the established technology standard (Henderson and Clark, 1990). Whilst incremental innovation introduces minor changes to the existing product, exploits the potential of the established design, and often reinforces the dominance of established firms (Nelson and Winter, 1982; Tushman and Anderson, 1986), radical innovation draws on a different set of technical and scientific principles, bearing stronger potential for new market opportunities (Dess and Beard, 1984). Therefore, the former reinforces the capabilities of established organisations with hardly any alteration of the market structure; in the case of radical innovation instead, new skills or problem-solving need to be developed, which endangers

profound changes in the market structure. This relationship is not always valid. In fact, although technical innovations may involve modest changes to the existing technology, their consequences on the market can be dramatic (Clark et al., 1987), such is the case of the market impact generated by each increase in bandwidth data transmission (i.e., e-commerce, communication platforms, streaming services, cloud services, etc.).

To offset such limitation, we explore whether the technological innovation originates from the same or different industry of the focal firm. Scholars have recently demonstrated how different stages of an industry's life cycle and levels of industry competition affect firms' business model innovation, and how such innovation translates into performance (Waldner et al., 2015). Research has also been conducted on the effects that different types of intellectual capital may have on radical and incremental types of innovation (Alguezaui and Filieri, 2010; Delgado-Verde et al., 2011; Dost et al., 2016; Buenechea-Elberdin, 2017; Agostini and Nosella, 2017). Business model innovation differs from other innovation types such as product, process, or management innovation because its unit of analysis is the entire activity system (Snihur and Zott, 2013). This implies that a change in a business model requires gaining legitimacy from a larger number of stakeholders compared to other innovation types. It is assumed that the interests of these stakeholders become more difficult to handle when the technological innovation is rooted in a different industry, that is, an even larger set of demands to satisfy. Laudien and Daxböck (2016) have examined business model change processes of manufacturing firms that pursue service transition and illustrated how path dependence plays a major role in firms' ability to innovate their business model; dealing with an innovation outside of your own industry implies also that firms cannot benefit from orchestrating business model innovation within their own technological trajectory. Therefore, taking into account the origin of the innovation provides further insight

on the process (i.e., which resources and capabilities are mobilised) whereby firms change their business models (Snihur and Zott, 2013).

Drawing on the above literature, we contend the existence of an interplay between different types of digital innovation and firms' innovation of their business model as a result of which some strategic approaches are preferred to others. The above literature highlighted how, while new entrants do not need to adapt their business model in response to digital innovation because they have the chance to design it afresh, incumbents must instead adapt (i.e., innovate) it. In the following section we introduce a conceptual matrix that illustrates firms' strategic responses to the advent of digital technologies.

3. Business model innovation in response to digital innovation

3.1 Towards a model of firms' strategic responses to digital innovation

To explore our research issue, we propose a conceptual matrix (Figure 1) that is built around two dimensions: i) the extent to which the impact of the digital innovation firms are exposed to is incremental or radical (Henderson and Clark, 1990) and ii) the industry of origin of the digital innovation, that is, same or different industry from the one of the focal firm. In particular, the former dimension is indicative of the extent to which the firm has to incrementally or radically adapt its internal resources, capabilities, knowledge and, in general, its intellectual capital in response to innovation (Nelson and Winter, 1982; Tushman and Anderson, 1986; Dess and Beard, 1984). The latter dimension is indicative of the nature of the competition (direct vs. indirect) and of the distance between the new DT and the technological path of the focal firm.

We argue that, when an incumbent is facing an incremental digital innovation introduced by a player in the same industry, its strategic approach tends to be that of imitating the business model of the firm that introducing the digital innovation (Casadesus-

Masanell and Zhu, 2013). In this case, the incremental nature of the digital innovation requires just a minor change of the expertise, skills, knowledge required and, in general, intellectual capital to develop and adopt the new technology. At the same time, since the digital innovation originates from the same industry, the focal company has to react timely with little space for further innovation and with the primary goal of draining market share away from innovating firms while consolidating its position within the industry. That is why the best strategy is to imitate the business model of the firm introducing the digital innovation. Instead, when an incumbent is facing a radical digital innovation introduced in the same industry, we argue that it has the opportunity to offer something (radically) new to the existing market. In most of the cases, it consists in using the DT to change the characteristics of existing products or services, thus changing the way existing customers are experiencing the product or the service itself, what they look for, and what they expect from future usages. In other words, the response of the incumbents consists in the creation of new market needs (Bucherer et al., 2002).

When an incumbent is facing an incremental digital innovation introduced from a different industry, we argue that it has the possibility of easily adopting the new technology with the aim of satisfying explicit or implicit needs of existing customers. In most cases, it consists in using the digital innovation for creating new products or services which can solve existing needs in the market. In other words, the response of the incumbent consists in the creation of new ways of solving existing needs (Christensen and Bower, 1996; Danneels, 2004). Finally, when an incumbent faces a radical digital innovation coming from a different industry, we argue that it is difficult to adapt the existing business model for adopting the new technology and a revolutionary strategic response is needed. In most of the cases, it consists in the adoption of the digital innovation and the creation of an entirely new business model. In other words, the response of the incumbent consists in the creation of a new

market, with new products/services, and new customers (Hart and Sharma, 2004; Seelos and Mair, 2007).

Insert Figure 1 about here

In the next section we present four illustrative case studies which make us possible to argue the aforementioned model.

3.2 Illustrative examples

We complement the above model with examples of four multinational incumbents operating in different sectors and known for their forefront approach to digital innovation. The choice of cases was guided by George (1979) and Pettigrew's (1990) recommendations and aimed at findings polar cases that could provide variation in the two dimensions and that help us in building a theory starting from a phenomenon (Ployhart and Bartunek, 2019). This study does not report on an inductive study, instead it aims at using "special" cases to discuss and analyse the relationships underpinning the theoretical model earlier presented, which other organisations would not be able to provide (Siggelkow, 2007:20).

We drew on a variety of qualitative secondary data sources to build a comprehensive picture of our case firms; the data collection process followed a loose timeline and partly overlapped with data analysis (Eisenhardt, 1989). Data were collected from company websites and other secondary data sources, such as financial and business reports, presentations, press releases, magazine articles, and books. The main data collection took place between April 2017 and September 2018. We used Microsoft as an example of incremental digital innovation from the same industry (i.e., the establishment of an ecosystem of app developers who could contribute to value creation) and Netflix as an example of radical digital innovation from the same industry (i.e., streaming technology).

We used Samsung as an example of incremental digital innovation from outside the industry (i.e., smart TVs) and Amazon as an example of radical digital innovation from outside the industry (i.e., cloud services). For each of the selected cases, we provide a brief description of the firm background, detail the digital innovation it has been confronted with, and illustrate the strategic approach chosen by the firm to handle the disruptive effects of the DT at stake.

Microsoft: dealing with incremental digital innovation from within the same industry

About the company - Microsoft is an American multinational technology company that develops, manufactures, licenses, supports, and sells computer software, consumer electronics, personal computers, and related services. The company is best known for the Microsoft Windows line of operating systems, the Microsoft Office suite, and the Internet Explorer and Edge web browsers, all products that enabled the company to dominate the software side of the PC platform. By grasping that Windows would be of no use and would not generate sales without any compatible machine, Microsoft's strategy was to rely on producing their own complements, i.e., the development of applications like Word, Excel, Outlook, e-mail, scheduler, and an information manager embedded in Windows. Their strategy to be a 'platform leader' differed, for instance, from Intel's approach, which made relatively a small number of complements to its microprocessors (Gawer and Cusumano, 2002).

About the digital innovation - Following the success of iTunes music store, in July 2008 Apple created a complete app store ecosystem that attracted numerous developers and generated 200,000 applications in two years (Kimbler, 2010; Lee and Raghu, 2014). Through the store’s open concept, any developer with expertise was given the opportunity to freely create a mobile app service (Laudon and Traver, 2010; Suh et al., 2012). By proposing a new, attractive way of delivering value to consumers, Apple sent shockwaves across the

entire mobile industry: on the one hand, owners of mobile handsets such as smartphones and tablets could access a number of key apps and services preinstalled while at the same time personalise it through the download of other free and premium apps from app stores (Kimbler, 2010); on the other hand, the app store enabled Apple to access a networked system whereby they could access a large user population and, as a result, provide a wealth of user-related information that would not exist had the applications been distributed via existing software deployment methods (Martin et al., 2017).

The app store market is already crowded and is quickly maturing. Successful players will be those capable of creating attractive business models for third party developers and providing them with marketing, sales, and payment solutions. Service providers can only extract value from app stores if they add some value first. They do not own mobile platforms nor developer communities. However, app stores can enhance users' experience in myriad ways, such as through enabling additional network-service Application Programme Interfaces, personalising the charge per usage, or tailoring application promotion in real time (Kimbler, 2010).

About Microsoft's strategic approach - By mid-2010, Microsoft had developed its own application stores (Middleton, 2010). In a context with strong pressures from competitors such as Linux, Microsoft's response to Apple's incremental innovation consisted in imitating their approach: establish a fruitful network of developers (Fox, 2017) and set up their own app store meant replicating part of Apple's business model, enriching the value proposition for subscribers. Though imitation has been the first, immediate response for Microsoft, there is room for further incremental innovation. The case at stake witnesses how the focal firm has built on the success of pioneers in the market to differentiate their offering and consolidate their position in the market.

The case points to an important finding: firms dealing with an incremental innovation originating from the same industry may be left with imitation as the only 'way out' strategy for survival. In the case elucidated above, mobile subscribers are getting used to app stores and soon they may simply expect their service providers to offer branded app stores as well. As argued by Kimbler (2010), offering an app store may become a necessity even without a strong business case, in the same way as retail banks have to offer Internet banking services (i.e., who will open a bank account today without having an Internet access?) even though they do not generate any substantial additional revenues for them.

Netflix: dealing with radical digital innovation from the same industry

About the company - Originally founded in 1997 in California, Netflix was selling and renting DVDs. Customers were able to watch the number of hours from a limited library equal to the credit they had spent each month. This strategy limited the scope of the instant viewing programme, and the company's intention was always to expand the potential of unlimited video on demand (VOD) delivered through an internet connection (Hiller, 2015). To date, Netflix has become a popular internet streaming and rental service that streams TV shows as well as movies. Individuals can subscribe to Netflix on a monthly basis and can watch on demand via nearly any internet-connected device (Morsillo and Barr, 2013).

About the digital innovation - The changes occurring in technologies of media and communications point to increasing personalisation and individualisation of the medium (Lotz, 2007). In fact, although streaming refers more generally to the process of delivering the media, the technology was first adopted, and its benefits widely diffused, within media and film industries either on-demand or live mode (Salkintzis and Passas, 2005; Rodriguez-Gil and Orduña, 2018). As a result, companies such as Netflix could shift the delivery of their value proposition no longer through traditional rental schemes but instead via on-demand screening. Netflix gained in more efficient processes, but also in personalised user

content as enabled by their recommendation engine (Love, 2012). That is why we can consider the streaming technology as a radical innovation coming from Netflix's industry (Hiller, 2015).

About Netflix's strategic approach - Netflix adapted its business model by adding a streaming video service as a complement to the established DVD-by-mail rental option. The company adapted their business model based on changes in technology and customer preference. Streaming enabled the generation and collection of consumer behaviour data. By building advanced analytics into its business model, Netflix's recommendations engine can support consumers make rental decisions (Gomez-Uribe and Hunt, 2015). This engine allowed Netflix to drive the long tail of video rental, with only 30% of its movie rentals from new releases, compared with 70% of the biggest player Blockbuster during those years (Giesen et al., 2010). Moreover, despite Blockbuster video responded with a similar offering, Netflix maintained its lead not only because it had patents on the 'ordered list' by which subscribers indicated online their movie preferences (Teece, 2010). The company's next innovation was the launch of a subscription-based streaming service in early 2007.

As Netflix's data centre capabilities started outgrowing, the company decided to migrate its Website and streaming services to a cloud environment. This move allowed them to grow and expand their customer base without having to maintain a data centre internally (Berman et al., 2012).

Netflix resembles the case of a digital innovation that, despite coming from the same industry, has engendered a radical impact (i.e., industry re-organisation). The case of Netflix, and his superior performance over competitors such as Blockbuster, witnesses that implementing a business model may require systems, processes, and assets that are hard to replicate (Teece, 2010). Their approach consisted in focusing on the recombination of existing capabilities to implement rapid cycles of technical and business innovation (Engel,

2011). Netflix is widely recognised as the industry standard for streaming content whereby audiences can watch the content of their choice on a number of different devices. Building on the case of Netflix, we argue that, despite the challenges attached to audience accessibility (Ellis, 2014, 2015), the strategic response of the focal firm in this scenario consists in the creation of new market needs. Entrant's success on the new market will depend on the strength of indirect network effects and on the consumers' discount factor for future applications (Zhu and Iansiti, 2012).

Samsung: dealing with incremental digital innovation from outside the industry

About the company - Started out as a small trading company in 1938 with operation across various sectors, Samsung's electric unit was founded as Samsung Electric Industries in 1969 with the aim of producing Original Equipment Manufacturing for electronic appliances. It was only in the 1980s that the company entered the telecommunications hardware sector with the production of switchboard, telephone, and fax manufacturing systems (Hobday, 2000). In 1992, Samsung became the world's largest producer of memory chips and the world's second-largest chipmaker after Intel. The advent of the digital economy represented for Samsung the opportunity to fully embrace DTs: in 2000, Samsung opened a computer programming laboratory in Poland, where they began their work with set-top-box technology and moved into digital TV and smartphones (Tchorek, 2011). In 2012, Samsung could be counted the world's top producer of smartphones (Hong, 2012) and gained a dominant position in the TV market as the industry moved to ultra-high definition (Statt and Tibken, 2015).

About the digital innovation - The digital era has revolutionised human society during the last century. Starting with the design of computers, phones, and different other machines, changes have taken place on an incremental basis across different technological domains. Ubiquitous computing along with ambient intelligence have emerged as one of the latest and

most challenging goals of the digitisation process, whereby automatic processes seek to build the so-called smart world, in which the real and virtual worlds co-exist (Chaouchi et al., 2013). Internet of Things (IoT) is somehow a leading path to the smart world with ubiquitous computing and networking. By encompassing a network-oriented vision of communication along with a focus on physical objects as the 'things' to be connected, IoT reflects a "world-wide network of interconnected objects uniquely addressable, based on standard communication protocols" (Ardito et al., 2017:1). In recent years, several projects have aimed at the integration of the IoT into a social networking framework (Atzori et al., 2014). As such, it is hereby argued that the technology, intended as incremental innovation, originates from an industry different from the one of our focal firm. IoT was originally introduced by an MIT-based Auto-ID research centre where major efforts allowed to identify products named EPC (Electronic Product Code), which was later taken up by the International Telecommunication Unit to explore new business possibilities around the new connectivity of environment objects to the network (Chaouchi et al., 2013). Smart media in particular have provoked technological convergence, which has led to high rate of growth, high value of concentration of patent, and high technological influence (Kim et al., 2015).

About Samsung's strategic approach - Samsung has taken up this opportunity by entering the market of Smart TV (within their now called Samsung Digital Imaging Division), a medium that provides broadcasting and Internet, applications, convergence, or intelligent services via the mounting of a CPU and operating platform on the set-top box or display.

Samsung’s response to the incremental innovation introduced outside of its industry constituted in the introduction of new products. We argue that, when an incremental innovation is introduced from outside the industry, the strategic response of the focal firm consists in the attempt to change the value proposition, thus modifying value creation strategy. The direct consequence of this response type is the possibility to strengthen the

relationship with existing market segments, and therefore the firm's positioning in comparison to other players.

Amazon: dealing with radical digital innovation from outside the industry

About the company - Established in Seattle in 1994, Amazon was originally launched as an online book seller. It was only later that they started selling other electronics goods until diversifying to other sectors. Amazon is the fifth most valuable public company in the world (Source: www.fortune.come), the second largest Internet company by revenue in the world (Source: www.cnbc.com), and the second largest employer in the United States (Source: www.eu.usatoday.com).

About the digital innovation - The radical innovation that Amazon has taken upon is cloud computing. In technical terms, cloud computing refers to both the applications delivered as services over the Internet and the hardware and systems software in the data centres that provide those services (Armbrust et al., 2010). Originally rooted in computer science and IT, the use of cloud computing has pervaded many other industries. That is why we can consider the cloud technology as a radical innovation coming from outside Amazon's industry (i.e., e-commerce).

About Amazon's strategic approach - Cloud computing has constituted a turning point in the offering of Amazon. Amazon Web Services (AWS) was launched in 2002 and the portfolio of services expanded over time. It consists of a set (more than 25) of proprietary web-based services owned by Amazon.com, ranging from simple storage to sophisticated database services. An extensive list of customers for AWS include Dropbox, UniLever, Airbnb, Nasdaq, and Netflix (Narendula, 2012).

Different utility computing offerings can be distinguished based on the cloud system software's level of abstraction and the level of management of the resources. The Amazon Elastic Cloud EC2 - central to the whole AWS infrastructure - was built in 2004 and can be

considered at one end of the spectrum. As hinted on earlier, the platform developed by Amazon allows to connect more closely with their customer base. Amazon did not discover bookselling; it redefined what the service is all about, what the customer gets out of it, and how the service is provided to the customer (Markides, 2006). By doing so, Amazon has become one of the pioneers bringing cloud computing closer to masses, helping number of start-ups bootstrap their businesses (Narendula, 2012). At the same time, Amazon has managed to transform previous 'fixed plus variable' cost models into entirely variable cost models, greatly improving efficiency and reducing early-stage capital requirements (Teece, 2010).

The case of Amazon witnesses, to the same extent as Microsoft, a scenario in which both value creation and value appropriation mechanisms are transformed (Amit and Zott, 2001). However, the extent to which technological change affects the firm's value proposition and cost structure is more far-reaching in this case. In response to a radical innovation deriving from another industry, we argue that it is very likely that the focal firm will aim at creating a new market, which, besides requiring the firm to familiarise with a new market segment, may engender a wider disruption within the industry. Building on the generativity potential offered by cloud computing, Amazon has opened new markets and found new clients, establishing itself as a web giant. Companies such as Schwab, Dell, Swatch, and Southwest are considered business model innovators along the same line as Amazon because they introduced new business models in their respective markets that attracted new consumers, by enlarging their markets (Markides, 2006).

4. Concluding remarks, managerial implications, and future research avenues

The current paper explores an interesting and current issue on how incumbent firms change their business models to cope with radical and incremental digital innovation. By doing so,

we engage with the scholarly debate about the impact of DTs on business model innovation (Baden-Fuller and Haefliger, 2013; Fitzgerald et al., 2013; Rogers, 2016). More specifically, the evidence discussed above has shed new light on how incumbents differently innovate their business models to the challenges posed by the emergence of DTs, depending on their nature (incremental vs. radical) and origin (coming from the same or different incumbents' industry). Our study reveals how there is not a right or wrong strategy that firms could pursue to adapt their business model, rather their strategic approaches may differ depending on the resources or assets (including intellectual capital) that need mobilising. In fact, more often than not, business model changes and innovations require full reconfiguration of a firm's activity system and knowledge management strategies (Casadesus-Masanell and Zhu, 2013; Nickerson, 1997), hence one business model may be preferred to others depending on how burdensome the reconfiguration process will be.

We hereby argue that the strategic responses discussed above can be described as least burdensome to most burdensome as we move from a situation in which the company has to deal with an incremental innovation coming from the same industry (imitation strategy for Microsoft) to the extreme opposite, that is, where companies are dealing with radical innovations coming from a different industry (new market creation strategy for Amazon). Imitation strategy emerges as an economic decision to make whereby firms' investment in new intellectual capital and complementary assets is minimal, whereas changes in both value creation and value appropriation mechanisms would entail firms to engage with more complex activities aimed at changing their entire business model. In between, there lie strategic responses that require firms to balance out their commitment to change with the investments in new. Besides the 'cost' of business model innovation, one aspect worthy of discussion is the timing according to which the adjustment takes place. The case of Netflix shows how the effects of radical innovations are more likely to be tangible in

the longer run (whilst founded in 1997, Blockbuster went bankrupt 'only' in 2010) and so does the innovation of the business model of those firms exposed to the disruption. Currently, Netflix is targeting other entertainment providers and is set to disrupt yet another part of its industry (Hopp et al., 2018). Similar insights could be drawn from Amazon, a case that has shown how the disruption caused by a radical innovation has meaningfully impacted firms' strategies related to value creation and value appropriation.

Increasingly management scholars are preoccupied with explaining how firms adapt their business models while embracing the potential offered by DTs with a focus on drivers (Achtenhagen et al., 2013; Andries and Debackere, 2006), processes (Bohnsack et al., 2014; Willemstein et al., 2007), facilitators of change (Mason and Leek, 2008; McNamara et al., 2013) and knowledge management strategies (Hussi, 2004; Cabrilo and Dahms, 2018; McConnachie, 1997; Buenechea-Elberdin et al., 2018). Moreover, most existing research focuses on how digital technologies impact on firms' processes of value creation and appropriation. Building on this scholarly effort, this research has explored how incumbents adapt their business model in response to digital innovation by characterising this latter in terms of its nature (incremental vs. radical) and the source industry in which it originates. Besides recognising that firms articulate the processes of value creation and appropriation as understood by Amit and Zott (2001), our findings shed light on the strategic approaches that firms may undertake when disruptive effects may be triggered by incremental or radical innovations. In particular, our theoretical model adds to Saebi et al. (2017) by providing insights on *how* such approaches are defensive (left-hand side of the matrix), with path dependencies influencing adaptability (Barberis, 2013) as opposed to proactive (right-hand side of the matrix), with a focus on the exploitation of market opportunities (Teece, 2010). More broadly, we connect with the ongoing debates within the strategy and innovation research communities whereby business model innovation is sensitive to industry-wide

forces of value migration and firms are called to change their primary business model while implementing others in parallel (Hacklin et al., 2018).

From a managerial point of view, our research offers managers and executives of incumbents with a clear indication as to which elements of their business model ought to be adapted given the opportunities as well as the challenges brought about by DTs. Indeed, not only we show that business model changes are strongly dependent on the specific type of DTs, differently affecting value creation and value appropriations strategies, but also contend that for the innovation to take place, firms must mobilise their resources and capabilities (including intellectual capital) accordingly, contributing to recent debates as to whether firms should embrace or not the new technology (Bucherer et al., 2012; Cozzolino et al., 2018; Knight and Harvey, 2014; Venugopal et al., 2018). In fact, we demonstrated that there exist archetypes of business models that develop in accordance with specific type of technological innovations. Therefore, we shed light on the strategy that managers should follow for innovating their business models based on the degree and nature of the innovation. This result is particularly interesting because it enables practitioners to identify when to use a less burdensome strategic response (i.e., imitation strategy when an incremental innovation is coming from the same industry) as opposite to when to use a more burdensome one (i.e., changing value creation and appropriation mechanisms, when a radical innovation is coming from a different industry). We also provide managers with indications about the timing according to which innovating the business model. In fact, since the effects of radical innovations are tangible in the long run, also the business model adaptation to this type of innovations can be put in place in the long run.

We believe this paper has laid the foundations for a deeper understanding of the interplay between business model innovation and digital transformation, in particular providing some anecdotal evidence on how incumbents may strategically respond to the

challenges posed by the emergence and diffusion of DTs. We hope our research and findings may inspire future studies to proceed along this line of inquiry, of which we have only started scratching the surface.

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