

PhD THESIS DECLARATION

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"Your education is a dress rehearsal for a life that is yours to lead."

- Nora Ephron -

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Ad Maiora!

Luca

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ABSTRACT

This thesis aims at investigating the broad research question related to capabilities that drive firms to success. In order to study the phenomenon from different angles and perspectives, three different papers compose this dissertation. The first article addresses the survival of former EU telecommunication monopolists, by unveiling how dynamic capabilities allowed major incumbents to face the two most severe shocks that challenged the industry in the last 25 years, i.e. the liberalization of the market and the market entry of the over the tops (OTTs), all those service providers that replaced services traditionally offered by telco operators only.

This study relies on 18,367 pages of archival material and 60 in-depth semi-structured interviews conducted with different managers of four former telco monopolists: Telecom Italia, Orange, Telefonica, and Deutsche Telekom. Results suggest that former monopolists, through dynamic capabilities, managed to switch from a paradigm of purely tech-driven R&D before liberalization to a more market-driven model after such shock, and move again to a pattern characterized by open innovation and R&D cooperation after the entry of OTTs. In a similar vein, the four focal companies also succeeded in moving from a sales only orientation to a marketing orientation and, later on, to a customer-centered marketing model, respectively before liberalization, after liberalization, and after OTTs market entry. Further, this study evidences how the first shock was essential for companies in order to succeed the second one: in other words, while it is true that dynamic capabilities are essential to cope with external shocks, at the same time, these shocks also foster the development of new dynamic capabilities, which can be used during subsequent shocks. The second paper considers various drivers, both at the entrepreneurial and firm level, that are mostly relevant for the market success of new ventures. More specifically, the main purpose consists in examining whether the professional and academic background of the entrepreneur, its related capabilities, and the capabilities detained by the start-ups cover a relevant role in explaining the market performances of such new firms. This study relies of a unique and originally developed dataset of 220 European, R&D-based start-ups that issued at least one patent during the first three years of life. Together with information about the new ventures, the database contains detailed information on the academic, professional, and entrepreneurial background of the founders. By adopting market success as dependent variable, results evidence the presence of a negative stigma unleashing on serial founders of tech based start-ups, a positive effect of patents and trademarks, respectively, for tech based and science based firms, a positive effect of engineering and science-related academic background of the founder, respectively, for tech based and science based firms. Then, this study shows how technical capabilities of the firm and technical competencies of the entrepreneur have a complementary positive effect on start-ups' market success. The third paper, then, is based on a single case study on a biotech subsidiary of a multinational enterprise. This study, which is empirically grounded into a unique database composed of publicly available material, restricted and archival documents, 13 in-depth, face-to-face semi-structured interviews with managers and specialized employees, attempts at reconstructing the story of Amgen Italy and disentangling how an ambidextrous culture has been promoted and actualized.

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PREFACE

The aim of this brief preface is to offer a quick overview of this PhD dissertation. I decided to dedicate my research efforts as PhD Candidate to better understand and analyze an intriguing broad research question: what are the capabilities that drive firms to success?

As anticipated, such research question is very broad, and probably a whole working life of researcher would not be enough to tackle all its components and implications. In order to shed additional light to the issue, I developed, with the precious support of senior scholars, three distinct papers, which constitutes the three core chapters of this dissertation. From a methodological standpoint, first and third papers are based on qualitative techniques, while second one uses quantitative analyses. Each paper uses a distinct, ad-hoc developed database (no third-parties generated datasets are used). Further, for all articles, the research question(s) drove the subsequent methodological choice, and not the other way round. I have no preferences for any of the technique used in the papers.

The first article, “Against All Odds: Adapting to Technological and Market Change in the EU Telecommunication Sector”, addresses the survival of former European telecommunication monopolists, by unveiling how dynamic capabilities allowed major incumbents to face the two most severe shocks that challenged the industry in the last 25 years, i.e. the liberalization of the market and the market entry of the over the tops (OTTs), all those service providers that replaced services traditionally offered by telco operators only. This study relies on 18,367 pages of archival material and 60 in-depth semi-structured interviews conducted with different managers of four former telco monopolists: Telecom Italia, Orange (formerly French Telecom), Telefonica, and Deutsche Telekom. Results suggest that former monopolists, through dynamic capabilities, managed to switch from a

paradigm of purely tech-driven R&D before liberalization to a more market-driven model after such shock, and move again to a pattern characterized by open innovation and R&D cooperation after the entry of OTTs. In a similar vein, the four focal companies also succeeded in moving from a sales only orientation to a marketing orientation and, later on, to a customer-centered marketing model, respectively before liberalization, after liberalization, and after OTTs market entry. Further, this study evidences how the first shock was essential for companies in order to succeed the second one: in other words, while it is true that dynamic capabilities are essential to cope with external shocks, at the same time, these shocks also foster the development of new dynamic capabilities, which can be used during subsequent shocks. According to this perspective, each shock is both “user” and “generator” of dynamic capabilities.

This article has many implications from both a practitioner and academic point of views. From a scholar perspective, first, this study provides additional empirical evidence on dynamic capabilities, a field so often criticized for being too theoretical. This paper also identifies some dynamic capabilities built during the liberalization that mostly positively affected the competitive battle with OTTs. Second, this research adds to the literature related to the failure of the incumbent without contradicting it; in fact, it shows how incumbents might have the chance of surviving exogenous shocks if they manage to develop proper dynamic capabilities. Lastly, it highlights how not only companies do use their dynamic capabilities in correspondence of an external environmental shock to face it, but they also develop new dynamic capabilities thanks to the same shock. Thanks to this mechanism, newly generated dynamic capabilities enhance the likelihood of surviving subsequent disruptions.

From a practical standpoint, this paper suggests how a harsher policy for monopolists can turn out being very fruitful also for themselves. It is out of scope of this paper to

demonstrate that a competitive regime is superior to a monopolistic one, but widely accepted economics theory takes it for granted; still, this study shows that opening the market to competition represented a tremendous opportunity also for those players which were supposed to be only damaged. Secondly, while it is unfeasible to provide a fully generalizable and detailed receipt for not succumbing aftershocks, this study provides some basic guidelines to managers, in order to make them able to change and adapt their companies to changing environments. Finally, this article suggests how often only resisting to change might not be the best solution: all telco operators realized that a strenuous war against over-the-tops would not have paid off in the long run, and they decided that, thanks also to the acquired ability of establishing fruitful partnerships, it might be better to face these new entities according to a “coopetitive” regime.

Switching to the second chapter of this dissertation, “Make Hay While the Sun Shines: an Investigation of Entrepreneurial and Firm-Specific Features that Drive Innovative Start-ups to Market Success”, here the intention is to disentangle the various drivers, both at the entrepreneurial and firm level, that are mostly relevant for the market success of new ventures. More specifically, the main aim consists in examining whether the professional and academic background of the entrepreneur, its related capabilities, and the capabilities detained by the start-ups cover a relevant role in explaining the market performances of such new firms. This study relies of a unique and originally developed dataset of 220 European, R&D-based start-ups that issued at least one patent during the first three years of life. Together with information about the new ventures, the database contains detailed information on the academic, professional, and entrepreneurial background of the founders.

By adopting market success as key variable, results evidence the presence of a negative stigma unleashing on serial founders of tech based start-ups, a positive effect of

patents and trademarks, respectively, for tech based and science based firms, a positive effect of engineering and science-related academic background of the founder, respectively, for tech based and science based firms. Then, this study shows how technical capabilities of the firm (represented by patents) and technical competencies of the entrepreneur (represented by an engineering-related degree), have a complementary positive effect on start-ups' market success.

This study, as the previous one, brings both academic and practical implications. First, it sheds additional light on the resource based view of the firm, by considering together both firms and individual capabilities as drivers for the market success of start-ups, underlying how some "golden matches" among capabilities might reinforce such positive effect. Second, it explains how the conflicting forces of negative stigmatization and positive learning, both generated by previous entrepreneurial failures, work and contrast each other. Third, this contributes to the macro research question about the driving factors for new ventures growth, survival and success.

In a similar vein, this paper provides interesting takeaways also to practitioners. More specifically, entrepreneurs may be interested in knowing in advance how some sets of entrepreneurial-specific skills and firm-related capabilities might be relevant for the market success of the start-up he/she is going to establish. Further, results of this analysis should suggest policy-makers to promote a climate that does not strongly stigmatize failed entrepreneurs; in fact, results support the idea that negative stigma can reduce the capacity of the founder to collect financial endowments, determining a lower likelihood of market success for the newly established start-up. To conclude, also venture capitalists might benefit from the implications of this study: in fact, this paper may contribute to identify, given different contingencies in terms of industry and geographic collocation, which infant start-ups

have a greater chance to achieve market success, and hence represent more worthy investments.

The third chapter of this dissertation, “Hit The Nail on the Head: Implementing and Promoting Contextual Ambidexterity at Amgen Italy”, is based on a single case study on a biotech subsidiary of a giant multinational enterprise headquartered in Thousand Oaks, United States. This study, which is empirically grounded into a unique database composed of publicly available material, restricted and archival documents, 13 in-depth, face-to-face semi-structured interviews with managers and specialized employees, attempts at reconstructing the story of Amgen Italy and disentangling how an ambidextrous culture has been promoted and actualized. Literature widely recognized ambidexterity as a dynamic capability itself, and this paper maps key strategical managerial decisions which allowed such ambidextrous culture to succeed; contextual or cultural ambidexterity differentiate from structural or corporate solutions because it does not prescribe a clear division from a temporal or spatial standpoint between exploitation and exploration. In fact, corporate ambidexterity usually refers to the acquisition of a small explorative start-up, the structural solution implies to set up a new explorative division, and contextual or cultural solutions claim for a reshape of the organizational culture, in a way that explorative and exploitative activities are performed in a complementary and not mutually exclusive fashion. The impact on employees’ satisfaction was tremendous, and this represents one of the reasons why the Italian subsidiary is a privileged observation point to study the phenomenon: from 2012 to 2015 Amgen Italy moved from the worst position to the top one, according to an internal ranking which considers all Amgen subsidiaries in terms of employee satisfaction.

Results show how a better climate, an efficient delegation system, a less bureaucratic and more horizontal structure, more communication among teams and with top management,

social engagement may promote an ambidextrous context. Further, investing more in employees' training and retention seems also to enhance employees' satisfaction and a long-run orientation. The establishment of six work streams turned out to be a successful operative tool to accomplish the desired transformation.

Again, this paper embeds both theoretical and practical contributions. From a theoretical perspective, it gives empirical evidence that an illuminated leadership style after a merger might promote cultural ambidexterity. This is interesting and somewhat novel, since the literature mostly linked M&As to corporate ambidexterity, which is characterized by a higher likelihood of failure. Second, the article unveils the complex interconnections existing among different organizational processes, routines and climate, which must work synergistically in order to properly establish cultural ambidexterity. Third, it shows how employees' satisfaction and engagement cover a crucial role in transforming a company culture.

From a practical standpoint, instead, it provides some takeaways on how an unsuccessful situation may be completely overturned, by assessing an evident success story that has its departure point on a less admirable and desirable scenario. Then, it furnishes several concrete and tangible operative tools that top management may put in action to promote ambidexterity and adaptation to change.

**AGAINST ALL ODDS:
ADAPTING TO TECHNOLOGICAL AND MARKET CHANGE IN THE
EU TELECOMMUNICATION SECTOR**

ABSTRACT

Literature in strategic management highlights many cases of incumbent's failure, a scenario that verifies when established companies lose their dominant position consequently to a shock of various nature. The European telecommunication industry offers us a quasi-experimental setting that gives a challenging opportunity to analyze a framework where incumbents did not fail, despite potentially disruptive shocks occurred. We claim that dynamic capabilities played a major role here. Telco operators used, created, and reused dynamic capabilities in correspondence of two events: the liberalization of the industry and the advent of over-the-tops. Our results, which are empirically grounded in 18,367 pages of archival material and 60 in-depth semi-structured interviews conducted with different managers of four former telco monopolists, show support for a theoretical mechanism according to which each shock is both a user and generator of dynamic capabilities. More specifically, when a shock occurs, firms use previously accumulated dynamic capabilities and, at the same time, develop new ones. Newly generated dynamic capabilities, then, become ready to be used consequently to a future shock, despite organizational forgetting and capabilities erosion reduce their effectiveness over time. Thus, our results confirm that dynamic capabilities are essential to cope with external shocks; however, at the same time, these shocks also foster the development of new dynamic capabilities, representing often a blessing in disguise.

INTRODUCTION

Scholars have long investigated a phenomenon described as “the failure of the incumbent” (Christensen and Bower, 1996; Tripsas and Gavetti, 2000; Sull, 1999). Such occurrence generates great interest both among practitioners and academics, because it describes a scenario where, after a given shock, previously dominating and well established firms rapidly lose market shares and eventually fail (Christensen and Bower, 1996). Literature shows different cases, where both the nature of the shock and the intermediate processes that lead to failure are heterogeneous. Consequently, both scholars and managers have also tried to understand how firms can survive substantial environmental shifts. One of the most prominent theories to address this issue calls for dynamic capabilities, the abilities of firms to create, extend, and modify resources (Helfat et al, 2009). Most contributions focus on how firms create dynamic capabilities. Considering the difficulty and cost of developing such higher order capabilities and the common failure to do so successfully (Danneels, 2011), an interesting question is how firm can properly develop and reuse dynamic capabilities, in order to maximize effectiveness and efficacy. Furthermore, dynamic capabilities, like ordinary capabilities, are negatively affected by erosion (Rahmandad and Repenning, 2016) and organizational forgetting (Argote, 1999); these processes clearly limit over time the effectiveness of dynamic capabilities in reconfiguring firms’ resources. Despite many attempted contributions in the last years, the theoretical lenses of dynamic capabilities continue to represent a breeding ground for understanding how firms capture change opportunities by rearranging firm resources (Schilke, 2014).

Our paper, in particular, aims at contributing to the following under-researched areas related to the dynamic capabilities paradigm (Schilke et al, forthcoming): tracking the mechanisms involving dynamic capabilities, unveiling a process-based approach to the

evolution of dynamic capabilities, and disentangling the role of dynamic capabilities in shaping the external environment. Specifically referred to the last claim, we see how not only firms are affected by institutional change and environmental shocks, but the same organizations might play also an active role in influencing the external environment. We will see how such two-ways interaction also promotes a generation of new dynamic capabilities.

The European telecommunication sector provides us with a quasi-experimental setting to explore the issue of usage and generation of dynamic capabilities for substantial environmental shifts. Incumbents faced a first shift in 1998, when the industry was liberalized, destroying their monopoly markets. In order to survive this shift, they had to develop dynamic capabilities. A second shift occurred in the mid-2000s, when faster mobile internet connection enabled service providers to offer products such as Skype or WhatsApp without operating or leasing a telecom network (over-the-tops). While the nature of the shocks and the challenges for incumbents were different, our study provides evidence that dynamic capabilities developed during liberalization played also a crucial role to face the second shock, i.e. the market entry of over-the-tops.

To study the European telecom sector and more specifically the ability of incumbents to continuously develop and use dynamic capabilities, we preliminary interviewed 5 telco managers, then collected archival data such as annual reports, conducted 60 in-depth semi-structured interviews with managers of Telecom Italia, Deutsche Telecom, Orange and Telefonica, and finally retrieve some performance data about the four previous monopolists.

Our results suggest that liberalization allowed former monopolists to generate dynamic capabilities, which turned out to be very useful, if not essential, to face the competitive pressure of over-the-tops later on. We develop a model that explains how firms develop

dynamic capabilities during the first environmental shift, providing a fine-granular representation of the microfoundation of dynamic capabilities involved in this process (Helfat and Peteraf, 2015; Teece, 2007). When the second environmental shift occurs, firms use these dynamic capabilities and also generate new ones. The empirical evidence suggests that organizational practices and institutional pressure facilitate the generation of new dynamic capabilities. We discovered that the four companies, with some individual differences, generated dynamic capabilities through organizational practices and institutional pressure, this latter referred to the attempts carried on by organizations to reshape institutions at their own convenience (Streeck and Thelen, 2005). In essence, firms were able to learn (Zollo and Winter, 2002) and routinize (Zott, 2003) dynamic capabilities, leading to a similar outcome through slightly different practices.

Hence, we make four key contributions. First, we extend the dynamic capability literature by explaining which mechanisms allow firms to generate and use dynamic capabilities consequently to an external shock. This builds on prior contributions that focused on how firms learn dynamic capabilities (e.g. Bingham et al, 2015; King and Tucci, 2002; Zollo and Winter, 2002) and the literature that discusses routines (e.g. Becker, 2004; Nonaka and Von Krogh, 2009; Zott, 2003). Second, we offer counter-examples to the phenomenon often described as the failure of the incumbent (Christensen and Bower, 1996; Tripsas and Gavetti, 2000; Sull, 1999). We see our contribution less in the fact that we describe the survival of incumbents but the identification of mechanisms that allow them to do so. Third, we add to the growing empirical evidence on the effect of dynamic capabilities (Helfat and Peteraf, 2009; Schilke, 2014; Stadler et al, 2013). Finally, by providing four different stories on how firms promoted in various ways several processes and mechanisms for the creation and evolution of their own dynamic capabilities' stock (Schilke et al, forthcoming), we present

a novel equifinality scenario where players reach a very similar ultimate goal by undertaking different actions.

SUBSTANTIAL ENVIRONMENTAL SHIFTS AND DYNAMIC CAPABILITIES

As anticipated in the previous section, the failure of the incumbent represents an intriguing phenomenon to be studied and analyzed. Polaroid represents a peculiar example of how severe a technological shock may be in terms of consequences for an incumbent (Tripsas and Gavetti, 2000): authors depict a circumstance where core competencies, which ensured for long time a competitive advantage to the firm, suddenly became core rigidities consequently to the digital imaging transition. Hence, the established firm did not manage to adapt to such radical technological change, old competencies did not fit the new scenario, and Polaroid almost failed. Further, Christensen and Bower (1996) unveil a situation where a technology that was previously conceived only for emerging markets, successively became mainstream; such replacement of the established technological paradigm determined the victory of entrant firms over established companies. Moreover, Danneels et al (2013) depicts an intriguing case where Olivetti, the previous incumbent in computer industry, recognized the new opportunity represented by electronic-based computers; however, internal and external resistance mechanisms did not allow the change to succeed, and, in a similar vein of other cases, the incumbent lost consistent market shares.

Developing and using dynamic capabilities represents a possibility to successfully face environmental shocks (Helfat et al, 2009). According to Teece et al (1997), “[*dynamic capabilities*] are the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments”. This suggests that firms need to develop dynamic capabilities when they face substantial shifts in the environment or demise if

they fail to do so (Danneels, 2011). As substantial shifts – commonly associated with new competitors – require swift responses, speed might be an issue and a joint application can be crucial for a successful and effective resources' recombination.

Although existing literature does not directly address how existing dynamic capabilities can be reapplied, it explains how dynamic capabilities can be learnt (e.g. Bingham et al, 2015). This is crucial for reusing as well, as adjustments will always be required when an existing dynamic capability is applied in a new situation and hence there is a need for ongoing learning. Experience and direct observation represent privileged ways to learn dynamic capabilities (Zollo and Winter, 2002); in fact, organizational practices such as alliances, M&As, international expansion allow a given firm to gain new fruitful competences (Argote, 1999) through practical involvement. King and Tucci (2002) showed that experience in previous markets enhances both the likelihood and the value of successive new market entries, thanks to the learning of valuable dynamic capabilities. Experience is particularly important since it allows reflection on past actions, for example how a specific tool for the execution of a particular task has been conceived, and it may help the understanding of cause-effect relationships (Zollo and Singh, 2004).

Learning of dynamic capabilities depends also on the exposure frequency to the previously mentioned experiences; in fact, empirical evidence suggests that too much or too few new knowledge at the same time might be detrimental for the learning process and, in a similar vein, exposure repetition, for an optimal learning outcome, should be neither too frequent nor too sporadic (Hayward, 2002). Previous research also suggests that organizational processes which are more similar to previously experiences have a higher chance to become successful dynamic capabilities (Zollo et al, 2002). Moreover, the literature acknowledges the codification of the organizational experience as increasing the chance of

learning dynamic capabilities (Zollo and Winter, 2002). Bingham et al (2015) help to understand the underlying mechanism of dynamic capability learning; the authors explain concurrent dynamic capabilities learning in Dow Chemical. Such a process is supported by a corporate function, namely the program management office and by a codified knowledge, which is specific to a particular phase, but then is used and developed sequentially across acquisitions, JVs, and divestitures. The concept of repeated practice as an important learning mechanism for the development of dynamic capabilities strengthens the link between dynamic capabilities and routines; in fact, repeated practice enhances the likelihood that people understand processes in a complete manner, and so routines can be developed (Eisenhardt and Martin, 2000).

Hence, a second literature stream that helps us to understand how reuse is achieved, is the literature on routines. Capabilities are tightly intertwined with actions and are part of specific activities (Schreyögg and Kliesch-Eberl, 2007). Dynamic capabilities need to be applied frequently if a firm wants to maintain them. Infrequent use is likely to result in organizational forgetting (Argote, 1999), and in capabilities erosion (Rahmandad and Repenning, 2016). To ensure such frequent application, firms can make them part of their routines. Dynamic capabilities might be embedded in organizational processes, which drive the evolution of resource configuration and operational routines (Zott, 2003). Winter (2003) acknowledges that both skills and routines, in order to be maintained, require frequent exercise and application. Routines are recognized both as behavioral and cognitive regularities (Becker, 2004): according to the literature that defines routines as behavioral regularities, they are described as recurrent interaction patterns; while, according to the cognitive regularities acceptance, routines comprehend a set of rules and standard operating procedures. However, this discussion on embedding dynamic capabilities in routines must not

be confused with the routines that provide microfoundations for some dynamic capabilities (Teece, 2007). In fact, while the first issue deals with the possibility of routinizing previously learnt dynamic capabilities, the second addresses the opposite scenario, i.e. organizational routines as building block of some capabilities (Winter, 2003; Salvato and Rerup, 2011). Tacit knowledge is often incorporated in routines, and their application allows such tacit knowledge to manifest its positive effects (Nonaka and Von Krogh, 2009).

The idea that dynamic capabilities can be routinized might appear counterintuitive since routines may be antecedents of organizational inertia (Hannan and Freeman 1984). Such potential contradiction does not stand because literature acknowledged the existence of higher order routines, which allow to preserve ongoing change processes (Winter 2000). In sum, scholars largely agree that dynamic capabilities can be seen as abilities, capacities, routines that allows to renew regular capabilities' stock that a specific firm detains (Helfat et al, 2009; Teece et al, 2007; Winter, 2003; Zahra et al, 2006), and so conserving such capabilities represents a core issue (Barreto, 2010; Galunic and Eisenhardt, 2001; Zott, 2003). Frequent application, though, can be costly. Hence, it makes sense to maintain dynamic capabilities only if the benefits connected to the readiness of such capabilities overcome the related costs (Zollo and Winter, 2002). Not surprisingly, Schilke (2014) therefore shows that the impact of dynamic capabilities on performance is strongest in environments of intermediate levels of dynamism. This allows firms to continuously apply and generate dynamic capabilities. Schilke's (2014) contribution highlights the particular challenge that substantial environmental shifts represent for firms; in fact, they have to find activities where dynamic capabilities are still useful, and they need to develop mechanisms that allow them to reuse dynamic capabilities once a new environmental shift occurs. R&D and marketing dynamic capabilities, which allow the firm to generate and modify competencies specific to a particular

technology or customer base, are recognized as being highly relevant for succeeding an external shock (Danneels, 2008). If marketing and R&D competencies respectively reflect the firm's ability to add new customer and technological competences (Danneels, 2002), then, internationalization, M&As, and alliances, are likely to represent core activities for learning and hence generating dynamic capabilities, as they commonly change the composition of technology and markets. Griffith and Harvey (2001) claim that dynamic capabilities may facilitate internationalization, and at the same time, internationalization might help renew capabilities' stock (Jantunen et al, 2005). M&A and alliances are complex organizational activities which require dynamic capabilities (Winter, 2003), but at the same time acquiring another company or establishing a business agreement with it could be sources of dynamic capabilities themselves (Rothaermel and Hess, 2007).

Furthermore, by considering the most prominent contributions on institutional change and its effect on organizations belonging to a mutated environment (e.g. North, 1990; Peng, 2003), we learn that firms and institutions operate under a paradigm of mutual influence. In other words, while it is undoubtedly true that firms try to adapt to institutional change, such process is just part of the whole framework: in fact, organizations often do not simply endure changes, but they also strive for modifying institutions in the most convenient way. Such active role played by firms toward the institutional setting promotes the development of a set of specific competencies and skills (Streeck and Thelen, 2005), which we argue may eventually lead to new dynamic capabilities.

THE TELECOMMUNICATION INDUSTRY

The telecommunication industry shares many similarities with sectors like the photography and the hard disk drive industry where incumbents failed (Christensen and

Bower, 1996; Tripsas and Gavetti, 2000). But, in contrast to these industries, former telco monopolists are still alive and survived both technological and market shocks: something must have made the difference. We decided to focus our study on the telco sector for many reasons. First, it offers us a quasi-experimental setting, where we have many former monopolists operating in different countries, which experienced main shocks at the same time (Williams and Mitchell, 2004). Two main shocks have been identified through five preliminary interviews conducted to managers of Telecom Italia. The unique purpose of such interviews was exactly to determine which are the shocks that mostly disrupted the EU telecommunication industry in the last 25 years. Thus, two most substantial shocks in the last 25 years unanimously resulted to be the liberalization in 1998 and the market entry of over-the-tops by the mid-2000s. Secondly, it is not the first time that the telecommunication industry has been selected to study dynamic capabilities; for example, Capron and Mitchell (2009) considered the international telco sector to assess a particular type of dynamic capability, i.e. the ability to select appropriate modes of capability sourcing. Authors acknowledge that the telecommunication industry represents a privileged field to study and assess dynamic capabilities. We build on this assertion by claiming that, in fact, the telecommunication industry satisfies the indications of Teece et al (1997) about when dynamic capabilities are mostly like to play a role: difficulty to determine the nature of future competition, rapid changes, critical timing. Thirdly, the former telco monopolists share many commonalities in terms of foundation dates, profits' evolution, and more broadly, historical pathways; this allows to more accurately concentrate on the target phenomenon and strategic individual decisions, depurating the study from other potentially biasing contingencies.

Finally, such industry was characterized by an innovation boost after liberalization (Rodan and Galunic, 2004), and innovation often requires the development and use of

dynamic capabilities (Hill and Rothaermel, 2003; Rothaermel and Hess, 2007). Liberalization refers to the end of state monopoly, which was the result of several EU directives aimed at ensuring that technological progress would lead to new services, lower prices and job creation (Schmidt, 1998). This first shock clearly has an institutional nature. An over-the-top (OTT), instead, is defined as “a service provider that offers telecom services, but that neither operates a telecom network nor leases networking capabilities from a telecom operator, relying only on the worldwide internet network” (Bertin et al, 2011). In other words, OTT services use the net to replace and offer services that often were provided by traditional telco operators.

Examples of OTTs are Skype, which replaces traditional phone and video calls, WhatsApp, which represents a direct substitute of SMS. Having clarified what OTTs are and offer to the market, it appears immediately clear how disruptive might have been the phenomenon for traditional telco operators: in fact, OTTs provide telco-typical services, without suffering relevant costs related to instalment and maintenance of networks, or infrastructure rentals.

To sum up, this setting allows us to study the development and use of dynamic capabilities that were required by former state monopolies to survive both liberalization and OTT entrance. Considering the fate of other formerly state-owned firms (e.g. in steel or transports), this was not a predictable outcome. Against common expectations, our data suggested that the government tilted the competition in favor of new entries. In Italy, for example “*Telecom Italia used to pay more for calls directed to other operators compared to inverted scenarios...*” (Network Engineer Director). More in general, both data from annual reports and in-depth interviews, unanimously rule out the possible alternative explanation according to which national government protected former monopolist; an exhaustive presentation alternative explanations will be provided in the discussion section. Thus, such surprising discovery encouraged us even more to study and unveil the complex dynamics,

hidden in organizational routines, procedures, and strategic direction, which allowed telco operators to do not succumb to liberalization and OTTs, despite there are some differences in the strategic actions carried out by each firm.

DATA AND METHODOLOGY

We adopt an in-depth historical case study methodology on the effects of market and technological changes on organizations, and the response of the focal organizations to such changes. This methodology is in line with prior studies that focused on organizational changes in correspondence of external disruptions, such as Danneels (2011) who analyzed Smith Corona, a typewriting company, Burgelman (1991) who focused on Intel to study organizational change and survival, Rosenbloom (2000) who explained how a market leader managed to survive after a disruptive technological change, Tripsas and Gavetti (2000) who concentrated on organizational change in correspondence of the digital imaging transition, and Sull (1999) who focused on Firestone's impediments to adoption of radial tire technology.

Since the large majority of EU former monopolists in the telecommunication field experienced the same outcome (a consistent market share enjoyed in the respective domestic market nowadays), our first idea was to focus on a single firm similarly to Danneels (2011), and then attempting at generalizing results. Nonetheless, due to the peculiar nature of the sector and the institutional relevance of involved firms, we decided to consider the four biggest former monopolists in Europe: Telecom Italia (Italy), Orange (France), Telefonica (Spain), Deutsche Telekom (Germany). Furthermore, Danneels (2011) himself admits: *“It should be empathized that a single firm case study cannot demonstrate the relationship between dynamic capability and success in dealing with environmental change”*. Following

Godfrey and Hill (1995), we learn that multiple case studies are among the best way to observe phenomena where problems of identification occur and quantitative studies would fail to fully grasp all the aspects and facets of the issue. In addition, Grant and Verona (2015) evidences how case-based research, when used to study organizational capabilities, offers several advantages: both the origin and the development of each capability might be isolated and the respective relationship to strategy can be unveiled.

Nonetheless, such research technique has its specific weaknesses, such as accuracy, discriminant validity, and consistency (Grant and Verona, 2015). We made huge efforts to at least curtail such potential biasing effects: we ensured data triangulation (Danneels, 2011), provided evidence of identifiable process (Eisenhardt and Martin, 2000), and accomplished repeated clinical studies (Godfrey and Hill, 1995). Studying four firms also increases generalizability. We build theory from cases, following an inductive process, reflecting what Bartunek et al (2006) regard as “the most interesting research”; positive aspects of theory-building from multiple cases studies include more robust outcomes, broader exploration of research question, and theoretical elaboration (Eisenhardt and Graebner, 2007). Hence, firms are not chosen with the purpose of computing a comparative case study of polar types of similarities, instead our choice of incorporating four comparable organizations in the sample reflects an intention to increase findings’ robustness and generalizability (Eisenhardt and Graebner, 2007).

Data

Our research is unfolding in four stages. We first conducted five qualitative interviews to unveil what have been the most disruptive shocks that affected the telco industry in the last 25 years; liberalization and OTTs market entry resulted the right candidates. We next

developed a comprehensive collection of on-line publicly available material and restricted archival one for the period 1990-2015. A greater use of archival data to make empirical progress in the field of dynamic capabilities is explicitly advocated by Schilke et al (forthcoming). Overall, we collected 18,367 pages of material. Retrieved information are classified according to ten different categories, each one being recognized by Schilke et al (forthcoming) as antecedent of dynamic capabilities; such antecedents are: experience, organizational structure, organizational culture, resources, information technology, human capital, leadership, managerial cognition, external environment, interorganizational structure. In this way, we are able to grasp the microfoundation of dynamic capabilities, in accordance with Eisenhardt and Martin (2000) who argue that dynamic capabilities consist in a set of specific and identifiable processes.

The third stage of our data collection consists in several qualitative interviews with telco managers. We conducted 60 in-depth interviews with managers from Telecom Italia (22), Orange (12), Telefonica (13), and Deutsche Telekom (13). Managers (both active and retired) are randomly selected through LinkedIn profiles, with the condition of having faced at least one of the two shocks (liberalization and over the top phenomenon) during the employment period. Then, we reconstructed the email address of the randomly selected active managers and we sent a mail asking them for a phone interview. For retired ones, we sent a LinkedIn direct message. Of those contacted by email with a request to be interviewed 21% responded and 14% accepted, which are reasonable thresholds considering the seniority and the spare time scarcity of the contacted professionals. We did not observe any recurrent feature among respondents and non-respondents, hence we are able to rule out the presence of potential systematic distortion in the sample (selection bias). Interviews have been conducted following a semi-structured approach; such method is widely preferred over fully structured

interviews (Cavusgil and Zou, 1994; Eisenhardt, 1989; Shrivastava and Grant, 1985), due to the great advantage of reducing the potential mental bias of the interviewer and, consequently, allowing unexpected concept to come out. For this reason, this third step has not only a confirmative, robustness-check purpose, but also an additional explorative aim. Interviews have been transcribed (768 pages) and coded according to a three-step qualitative technique that includes open coding, axial coding, and categorization (Strauss and Corbin, 1998).

The final step consisted in retrieving quantitative performance data related to the four telco operators, in order to benchmark the strategic orientation adopted by the companies and triangulate these data with archival ones and qualitative interviews; such stage confirmed that all the four telco operators enjoy comparable market shares, profits, and absolutely did not suffer the failure of the incumbent phenomenon. However, we accomplished this step only to have a confirmation that companies analyzed are far away from being categorized as incumbent failure cases. We purposely avoided any kind of investigation about direct relationships between dynamic capabilities and performance, in order to do not fall into a tautological reasoning. In fact, a direct association between competitive advantage or performances with dynamic capabilities turns being tautological (Helfat et al, 2009).

Analysis

The method adopted required a continuous switch between empirical findings, both from annual reports/ strategic plans and interviews, and theoretical knowledge on dynamic capabilities (Danneels, 2011; Weick, 1989). Such procedure allowed us to simultaneously provide empirical support to theoretical statements but also demand new empirical investigation to some relevant literature issues. Also interviews' configuration, according with the semi-structured nature, have been slightly modified during the ongoing analytic process,

in order to grasp new intriguing aspects of phenomena that were not considered at the beginning. For example, many interviewed spontaneously declared that liberalization helped the company to succeed also the over the top shock, although the competencies needed for the two disruptions were not the same. Such event lets us investigating more into deep the phenomenon, by asking to next managers which is the standing relationship between capabilities needed to face the liberalization and the ones which allowed to succeed the OTT shock. In this way, the empirical part does not serve merely the purpose of validating existing concepts that we had in mind, but also brings out new concepts to be successively validated by next interviews.

Such research design justifies our decision to have a slight unbalance in favor of Telecom Italia in terms of interviews repartition among telco operators. In fact, since we started to interview manager of Telecom Italia, first interviews aimed primarily at refining our research scope; such component, as previously anticipated, never disappears from our intentions, but it gave gradually more room to empirical support for theoretical conjectures. Thus, in terms of conversation time dedicated at providing confirmation evidence to the theoretical mechanism conceived in an ongoing fashion, the repartition among the four firms appears homogeneous. Once we finalized interviews to Telecom Italia managers, we conducted interviews to other managers from Orange, Deutsche Telekom, and Telefonica simultaneously. To analyze archival material and interviews, we chose to concentrate on the ten antecedents previously mentioned (Schilke et al, forthcoming), in order to unveil dynamic capabilities. Further, we also wanted to highlight the competencies needed by firms to succeed at each period of time. For the sake of our study, three essential periods are taken into account: before liberalization, after liberalization and before OTTs market entry, after OTT market entry. In order to provide a comprehensive picture for each period, we adopt a four

blocks representation aimed at illustrating the nature of capabilities (Verona and Ravasi, 2003). Essentially, such four blocks structure will be conceived for each focal firm, time period, and analyzed capability, which are R&D and marketing; as result, we got 96 blocks related to 24 distinct capabilities related to a specific time window and focal telco operator.

R&D and marketing dynamic capabilities has been largely recognized as being relevant second-order competences (Danneels, 2008). R&D competence is defined as the ability to develop new technological competences through R&D activities (Danneels, 2002); a higher level of such firm-specific competencies leads to more efficiency and effectiveness of the whole R&D activities (Patel and Pavitt, 1997); in a similar vein, the more R&D activities are performed, the more is likely to develop such competencies (Baysinger and Hoskisson, 1989). According to Danneels (2002), marketing competence reflects the ability to develop new customer-related abilities and procedures; it is commonly believed that distinctive marketing competencies lead, *ceteris paribus*, to superior performances for the firm (Woodside et al, 1999). However, we clarify that our intention is to do not limit the potential theoretical insights coming out from the case studies; hence, the previously selected analytical structures aim at being mostly a guideline for conducting the qualitative research rather than a strict binding condition.

A BRIEF HISTORY OF THE FOCAL FIRMS

Coherently with previous articles that rely on case study, we provide few historical insights on the whole business life of the four telco operators (e.g. Rosembloom, 2000; Tripsas and Gavetti, 2000; Danneels, 2008), although we focused our study only on the period 1990-2015. It would have been impractical to extend backwards our analysis, due to difficulties in finding managers who experienced periods that are temporally very far away.

Telecom Italia

Telecom Italia was, like all European telco operators years ago, a monopolist. The Italian former monopolist gets its roots in 1925, when Mussolini's government divided the Italian territory in 5 macro areas, each one with an own telecommunication operator. Many years later, in 1964, the five companies merged into a unique corporation, SIP. In 1985, the entire telephone network became based on phone numbers, following other European operators; in addition, in the same period SIP introduced fiber optic cables, enhancing dramatically the power and the speed of the national network. In 1993, several other improvements have been made to the infrastructure, introducing the green number (business users that can be called for free by customers) and other telecommunication services.

The name "Telecom Italia" was created in 1994, after a merge among SIP, Iritel, Telespazio, Italcable and SIRM; all those firms were active in the field of telecommunication. As the mobile phones era started, in 1995 the Telecom Italia Mobile (TIM) division was created: TIM was the first mobile operator in Italy. Three years later, following a similar process, Telecom Italia Net was established, a company fully dedicated to the exploitation of internet services. 1998, like for the other three telco operators, represents the year of liberalization for the fixed telephony sector, with all the consequences in terms of strategic orientation that we will discuss in the next chapter. The 2000s for Telecom Italia were characterized by some attempts of expanding its international presence to Latin America (for example TIM consolidated its Brazilian presence in 2002 and in 2003 Telecom Italia gets option on stake in Telecom Argentina holding).

From a technological perspective, we assisted in 2002 to the introduction of text messages (SMS) by TIM and the broadband wireless. In the next year, TIM launched the mobile TV service, being the first operator in the world to offer such tool. In 2004, TIM

introduced the UMTS technology, which permits faster data connection through mobile devices. 2005 was the year of web TV, which allows watching television using the network to download contents. In 2008 was activated the mobile payment service, making it possible to use the mobile phone as a virtual wallet to make small daily payments. As the decade was going to end, experimentations with the new 4G faster mobile protocol have been made, improving sensibly the quality of data connections. In most recent years, we assist to a unification strategy, for the sake of gaining efficiency, rationalizing the group's structure, and simplifying the services' portfolio (AP, 2014; 2015): TI media was incorporated in Telecom Italia in 2014 and, two years after, TIM became the unique brand for all the divisions, similarly to what happened for Orange / French Telecom.

Orange

Orange S.A., formerly France Télécom S.A., has its roots in the Direction Générale des Télécommunications, a division of the Ministry of Posts and Telecommunications created in 1941. During 1970s, France was in a backward position respect to other EU countries for what concerns the network infrastructure: the program "delta LP" was then set with the purpose of overcoming such weakness. In the following years, the majority of existing local loops were built (cables linking users to the operator). Following a EU directive, the Direction Générale des Télécommunications became autonomous in 1990 and changed name to France Telecom; the same directive will make competition mandatory in the telco industry starting from 1 January 1998. The company was then privatized in 1998.

During the third millennium, France Telecom promoted its international expansion with a special focus to Africa and Europe. As exemplificative evidences of such strategic direction we mention the change into Orange of Globtel in Slovakia, Mobil-Rom in Romania,

Ivoiris in Ivory Coast, Mobilis in Cameroon (2002), the acquisition of remaining stake in Orange Slovensko (2005), the joint venture with China Telecom (2006), the acquisition of majority stake in Telkom Kenya (2007). Also from an innovation perspective, we are able to observe a propensity to focus on the African market with the launch in 2006 of Orange Money, a mobile payment service in Africa, and the landing of the new ACE (Africa Coast to Europe) submarine cable in 2011, which will link France to South Africa and serve 23 countries. Orange as brand logo was regrouped the France Telecom divisions of mobile, landline, internet and IPTV services starting from 2006. Later on, in 2013, the whole company was renamed as Orange, following a decision of the 2013's Annual Shareholders' Meeting, where presents approved changing the name of the group to Orange S.A.

Telefonica

The origins of Telefonica date back to 1924, when the Compañía Telefónica Nacional de España (CTNE) has been founded. The Spanish government owns 79.6% of CTNE shares in 1945, right after the end of world war two. CTNE in 1960 becomes the first Spanish enterprise both in terms of shareholders (approx. 100,000), and employees (approx. 32,000). Eighteen years later, Telefonica celebrates the installment of its ten-millionth phone, highlighting the success and diffusion of the phone in Spain. Also from a capital point of view, the Spanish monopolist started to look overseas, beginning trading at the New York stock exchange from 1987. Three years later, the telco company changed its name in Telefónica SA, together with the establishment of the Telefonica España division, which manages all the domestic activities. Such division was successively incorporated in Telefonica International. Nineties were also the years of international expansion of the company, with a special focus on Latin America, a privileged market for both linguistic and

cultural aspects: for example, Telefonica enters Chile with CTC (1990), Argentina with TASA (1990), Peru with TdP (1994). Simultaneously with the launch of its Peruvian subsidiary, Telefonica also becomes officially active in the digital mobile telephony industry, with the establishment of Movistar. In 1997, Telefonica started its privatization process in accordance with the EU regulation, and in 1999 it becomes fully public; by the same year the company also strengthened its internet-related business with the launch of ADSL.

During the 2000s Telefonica boosted an intensive promotion of joint ventures, acquisitions, and industrial alliances with Latin American, European, and Chinese firms. Related examples are: joint venture with Portugal Telecom in Brazil, leading to the creation of Vivo (2003), acquisition of Cesky Telecom (2005), industrial alliance with Telecom Italia (2007), strengthening of the strategic alliance with China Unicom (2009). Most recent years are characterized by a partial inversion of this trend with the sale in 2014 of Telefonica Czech Republic, Telefonica Ireland, and stakes of Telecom Italia. These actions are justified by efficiency reasons, but the company concentrates more on marketing related activities, according to a new fully customer-centric orientation (AP 2014).

Deutsche Telekom

Deutsche Telekom has its roots in the “Deutsche Bundespost”, the federal German government post office founded in 1947. During the 1950s, the Bundespost had to rebuild its network infrastructure and many buildings, due to the severe damages and destruction caused by the world war two. Much of prewar Germany's telecommunication infrastructure was based on east-west communication networks between Berlin and western industrial cities. After the division of Germany, the west was a long a tight territory where main network

connections became the axes north-south. Such division into different occupation areas fragmented telco infrastructures and delayed the establishment of a fully integrated network.

Later on, in 1989, the Deutsche Bundespost has been divided into three organizations, one being Deutsche Bundespost Telekom, which was renamed in 1995 as Deutsche Telekom AG, after the merger between the telecommunications companies of former east and west Germany in 1990. After the liberalization imposed by the EU directive, Deutsche Telekom also promoted several initiatives aimed at increasing its worldwide presence, with a special focus on Europe. Examples of this propensity are the acquisition of stakes in Hrvatske Telekomunikacije (2000), the launch of T-Mobile brand name in the UK, Austria and Czech Republic (2002), the increases of stakes in Polska Telefonia Cyfrowa (2006) and in the Hellenic Telecom Organisation (2008). Deutsche Telekom changed its organizational structure in 2005: the divisions of T-Com and T-Online were merged and became the Broadband/Fixed Network (BBFN) strategic business unit. The organizational structure of Deutsche Telekom was changed again in 2008, when T-Online was separated from Deutsche Telekom and merged with T-Com into the new unit T-Home.

FINDINGS

Telecom Italia, Orange, Telefonica, and Deutsche Telekom operated under monopolistic regime till 1998. Previous research clarified that firms operating under monopolistic regime need very different capabilities compared to companies that face competition (Kogut and Zander, 1992). Then, liberalization came and incumbents had to adapt to the newly liberalized environment. At that time, firms had to develop new capabilities, mainly related to marketing, R&D model, and ability to compete in general. Not only did such competencies allow firms to survive the liberalization shock, but they also

helped telco operators to face in a more proper manner the subsequent shock, i.e. the advent of over the tops. Dynamic capabilities are in fact generated during the liberalization and in subsequent year through several organizational practices, such as hiring of new personnel, alliances, and acquisitions. Pressure exerted by firms on institutions after liberalization also promoted the creation of new dynamic capabilities, which turned out being useful to face the OTTs shocks. Hence, all these antecedents modified and enriched the existing stock of dynamic capabilities owned by organizations, and allowed firms to more quickly change their first order competencies when OTTs entered the market. Figure 1 summarizes and graphically explains such theoretical mechanism.

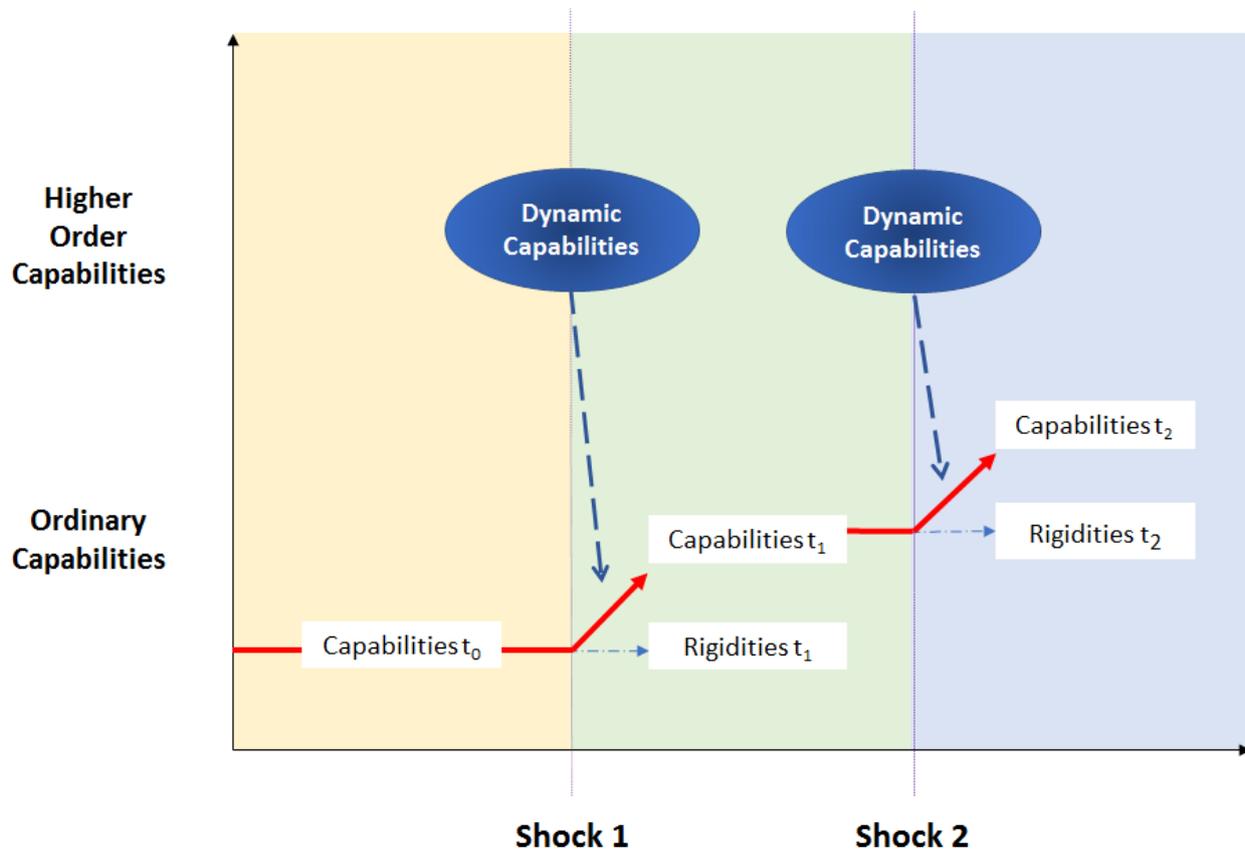
Thus, our findings confirm that in order to survive substantial shocks in the environment, firms need to develop new resources and capabilities. Our study on the telecom industry in Europe suggests that incumbents developed dynamic capabilities, which allowed them to alter their resource base. More interestingly, it also reveals that dynamic capabilities developed during one shock and in subsequent years may be crucial when a new shock appears. In other words, survival to shocks is possible through a combination of new dynamic capabilities and the application previously generated dynamic capabilities, no matter whether the nature of shocks is different.

The rest of this section aims at providing a comprehensive and detailed picture of the studied phenomenon, highlighting the individual differences in terms of actions carried out by the four telco operators. In order to get these results we carefully considered theory, archival material and interviews from all the four telco operators part of the sample. For illustrative purposes, we adopted a top-down structure, starting from a purely theoretical and general framework, to industry related findings, and finally to company specific takeaways, highlighting first the commonality and then the differences.

General Framework

From a theoretical and abstract standpoint, we are addressing a scenario where the focal period (1990-2015) is divided into three distinct time windows, i.e. time before liberalization, time after liberalization and before OTTs market entry, time after OTTs advent. Each time is characterized by different ordinary or first-order capabilities that allow players to detain a competitive advantage. However, when an external shock of different nature disrupts the industry, ordinary capabilities required undergo variations, in a more or less radical manner depending on the severity of the shock itself. At this time, dynamic capabilities (or higher order ones), play a role: they allow firms to modify their ordinary capabilities in order to be compliant with the newly required ones (Teece et al, 1997). Thus, depending on the proper creation and use of previously existing dynamic capabilities, core capabilities detained at previous time, may evolve into new core competencies or become core rigidities (Leonard-Barton, 1992). In the first case, the firm has good chances to succeed and adapt to the shock, while the second scenario depicts a situation that can lead to the failure of the incumbent. Such theoretical framework, which is graphically represented by figure 1, repeats itself every time there is a new shock.

Figure 1. A conceptual model,



Industry Related Findings

Despite firm-specific characteristics and differences related to strategic directions undertaken exist and will be analyzed in next sections, the telecommunication industry in Europe experienced two essential shifts, both in terms of R&D and marketing paradigms; such changes occurred in correspondence of the two identified shocks, i.e. the liberalization and the market entry of OTTs.

R&D Competences and Paradigm:

Concerning R&D, companies before liberalization were almost totally relying on engineers' technical knowledge and opinions to orientate investments in R&D, without fully considering customers' needs. Such behavior was reasonably justified by the fact that no

competitors were present on the market, therefore customers had no chances to switch to a different operator. Essentially, engineers and scientists allocated to R&D departments concentrated mostly on technical issues, such as the improvement of calls quality and the instalment of new cables. After the liberalization and the consequent market entry of new competitors, former monopolists had to change their R&D model, in favor of a more market-driven orientation:

“After liberalization, our R&D model became much more market and innovation oriented. We focused on what customers really want.” (Program Director, Telefonica)

Hence, we argue that, thanks to dynamic capabilities, main players in the telecommunication industry were able after 1998 to switch from an almost purely tech-driven R&D model to a more market-driven one. As will be shown in next sections, such paradigm modification did not come in an effortless way, and it implied several strategic actions and change of managerial directions. After liberalization, R&D departments started to work more closely with marketing colleagues, focusing more on those innovations that could potentially enhance customer satisfaction. Examples of this change of mentality are the development of more user-friendly DSL modems, the development of wireless broadband and the introduction of video calls. Common operative managerial activities include hiring people from other market operators, learning from expanding international presence in competitive markets, joint ventures agreements signed with hi-tech companies and universities, a general reduction of bureaucracy and hierarchy, establishment of commercial skills training for employees, globalization of R&D labs, business model renewals, acquisitions of telco companies abroad, other types of strategic alliances.

“After the liberalization, Telecom Italia had to learn to compete; we can sum up the capabilities acquired into communication and marketing competencies, which added to the previously existing technical competencies” (Director of Multimedia Entertainment, TI).

“A globalization in terms of R&D labs allowed Orange to release innovations which are closer to customers’ needs.” (Innovation Director, Orange)

Then, starting from the late 2000s, as anticipated, another challenge shocked the telecommunication industry: the market entry of OTTs. Once again, former monopolists reacted by changing their R&D paradigms, moving to a more open R&D structure, where cooperation becomes more common, especially for what concerns basic research:

“Telecom Italia labs for R&D represented a strategic asset to survive and to continuously innovate, mainly for explorative purposes. Start-up incubators also allowed us to benefit from a fresher mentality, an intangible renovated way of doing business, and a greater ability to be closer to customers’ needs. Without any doubts, these assets helped us to better face the OTT challenge.” (R&D Manager, TI)

“...However, understanding how near worlds work is crucial to understand also OTTs [which are global in nature]. In particular, marketing and R&D strategies took an advantage in terms of open-mindedness triggered by post-liberalization international expansion. Strategies became more flexible, 25 years ago “long run” was defined as 20years: now talking about strategies for next 20 years is simply crazy!” (Premium Services Manager, TI)

“Deutsche Telekom started a collaboration with other telco operators worldwide, in order to increase the effects of economies of scales and knowledge transferring.” (Supply Chain Manager, DT)

Also for what concerns this transition, companies had to promote a deep change of mentality. After the appearance of OTTs, many research projects started to be implemented in cooperation with external entities, such as financial institutions to develop mobile payment systems or with OTTs themselves to offer contents and connectivity in bundle.

The change of paradigm was facilitated by the previous switch accomplished consequently to the liberalization. Common operative managerial activities that allowed such transformation to occur include cooperation with universities and public research centers, infrastructural development, adoption of more flexible strategic plans, partnerships with OTTs themselves, international expansion, acquisitions of more open-oriented small corporations, hiring of new employees with a more sharing-oriented mentality, facilitation of employees

mobility and rotation across countries, promotion of start-ups' accelerators, promotion of team-working, bureaucracy and vertical hierarchy reduction (in favor of a more horizontal, collaborative structure), more international and cultural diverse management boards:

“Internationalization also helped us to face OTT in a more collaborative approach, we are attempting to get the best from every situation...the advantages of a team-based structure are many: it enhances the possibility to communicate among different team members of different department located in different countries. In case of a competence lack, now it is very easy to reach a competent team worldwide. In this way we can face change. In 2002 teams were divided according to areas: there was the western Europe team, the US team, [...] but there was no communication among those, each team reported and communicated only to the headquarter. Things gradually changed, also thanks to what we learnt abroad, and in 2010 teams were finally organized according to a fully linked and transparent horizontal structure.” (IT Project Manager, DT)

“There is nothing that prevents us to use the same agile model of OTTs, but there is both resistance from employees (cultural aspects) and from the financial department: in fact, many changes, although necessary, do not bear fruits immediately and in terms of NPV is not possible to measure them in the short run. Fortunately, in the last period such transition is happening...last period was characterized by many alliances and partnerships which are helping to change” (Optical Architecture Manager, DT)

Marketing Competences and Paradigm:

The two aforementioned disruptions that challenged the European telecommunication industry had a relevant impact also on the marketing paradigm. More specifically, the companies moved from a situation of having almost no marketing departments (only sales responsible divisions), to a scenario characterized by intense marketing activities and customer loyalty building after the liberalization of the market. That was the time when former monopolists started to consider the marketing aspect of their business in a more comprehensive way. Before liberalization, telco operators were essentially interested only in enlarging their customer base, especially for what concerned the growing mobile sector, without caring about the repartition of such customers; in fact, the monopoly regime assured players that, after creating a new customer, this latter will be served by the monopolist itself.

Examples of this strategic orientation are the sales campaigns promoted by European telco operators during the first nineties; common slogans were: “When the normal phone is not enough anymore” or “The telephone on your way”. Then, effective marketing departments were set up and companies promoted many initiatives to increase customer loyalty and lock-in effects, including bundling strategy, implementing a KPI measure of customer satisfaction, more efficient customer services, and brand image promotion:

“With Liberalization, we totally changed our business model. We had basically to build up from scratch the sales and marketing divisions.” (Project Manager, Telefonica)

“The mission of the company, after liberalization, was completely overturned: the imperative shifted from serving the company to serving the customers. It was high time to learn how to compete: the alternative to achieving such skills was die” (Marketing Manager, Orange)

After the liberalization, marketing became not only advertisement, but also more attention to existing customers in order to avoid that they switch to competitors. For example, Telecom Italia reduced drastically its intervention time, e.g. the average time elapsed between the malfunction reporting and the effective intervention by technicians. In a similar vein, Deutsche Telekom introduced “customer satisfaction” among its key performance indicators (KPI).

Common operative managerial activities that contributed to achieve such transformation include: hiring new employees coming from other market operators, marketing formation of engineers, expanding international presence in competitive markets, brand renewal, internal bureaucracy reduction, alliances and joint promotions of big events such as Olympic games, renewal of business models, acquisitions of other telco operators abroad, increasing sizes of marketing (previously sales) departments, introduction of customer satisfaction measures in KPI’s lists, workforce training:

“...From monopolist to market operator, we tried to manage such shift also by acquiring external competencies, hiring people coming from other market operators” (Area Manager, TI).

“Liberalization promoted a change of priorities of Deutsche Telekom. The firm tried to be more marketable, through more attention to customers. This led to an increase in reputation.” (Supply Chain Manager, DT)

Then, when OTT entered the market, telco operators had to switch again the marketing paradigm, getting closer to a fully customer-centered marketing model. Such transition was necessary due to competitive advantage in terms of customers' proximity detained by OTTs. Essentially, former monopolists began to put the customer at the center, and reshape the organizational processes according to such new vision and mentality:

“OTTs pushed TI and other telcos to transform their value proposition: now customers spend, on overall, much more. OTTs created a new customers' need and a new opportunity for telcos. Competencies generated during liberalization helped to speed-up this opportunities' recognition” (Business Sales Manager, TI).

“The services' quality was enhanced: mobile network, fixed telephony, customer relationships, satisfaction ratio measurement are only some issue that we took into serious consideration at that time. We were willing to be the number one in France, for example the quality of transmission for voice calls, the coverage of mobile network, and information systems stability were drastically improved.” (Project Manager, Orange)

After OTTs entry, in fact, we assist to a proliferation of tailored commercial offers, according to a “mass-customization” paradigm: it became not uncommon for customers to receive calls from operators that offered them unique promotions, available only for the specific customer. In order to successfully accomplish this additional transition, the former monopolists performed various activities such as: infrastructural development, adoption of more flexible strategic plans, partnership with OTTs, international expansion, new employees' hiring, promotion of start-ups' incubator programs, facilitation of employee mobility across countries, renewal of the internal IT infrastructure:

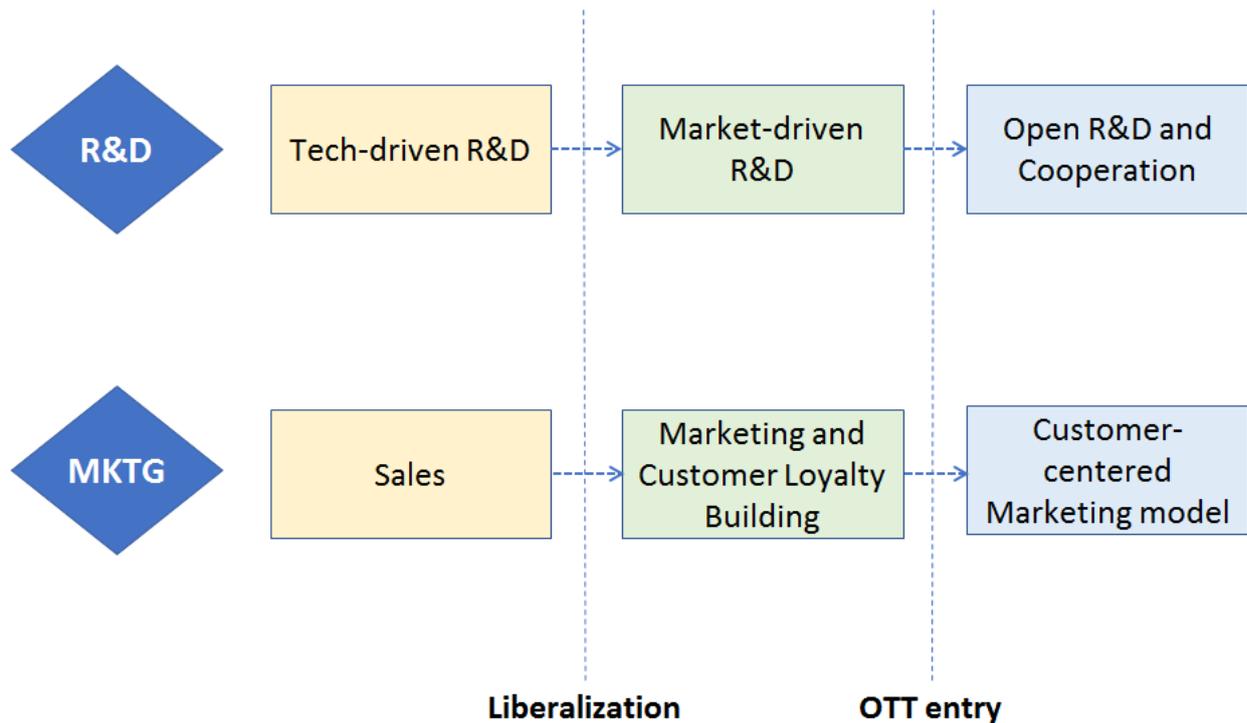
“The initial impact with OTT was dramatic. We were spending a lot of money in submarine wires, then Google pretended to use them for free. We threatened OTTs by hypothesizing a block of their traffic. Things changed and nowadays there is more cooperation. For example, we share some costs with Facebook.” (Universitas Telefonica)

“Being more customer centric turned out to be crucial to face OTTs. A clear example of this is represented by the fact that after liberalization we learnt to fight for our customers.” (Big Data Director, Telefonica)

Concluding Remarks

In essence, from a R&D paradigm perspective, the EU telco industry was characterized by a tech-driven orientation before liberalization, which evolved to a market-driven orientation after the first shock, then companies finally concentrated on open R&D and cooperation after the OTTs market entry. Regarding marketing, we assist to a shift from a pure sales orientation to marketing and customer loyalty building after liberalization; then, after the second shock, companies started to adopt a customer-centered marketing model. What must be also remarked at this stage is the strong interconnection and interrelation that exists between the two shocks. In fact, from both a R&D and marketing strategies point of views, it would have been almost impossible a direct transition from the existing paradigm before liberalization to the current one after OTTs market entry. In other words, the first shock revealed to be extremely useful, if not essential, for the survival and prosperity of the focal firms after the second shock, being often defined by interviewed as a *“blessing in disguise”*. Figure 2 summarizes key takeaways related to this discussion.

Figure 2. Key Industry Findings.



Company Specific Findings

Liberalization

Liberalization represented a clear point of disruption for all the telco monopolists which were operating in Europe at that time. We must imagine a scenario where these companies safely relied for decades on the comforting monopolistic regime, where all the risks and challenges derived by competition simply did not exist. Marketing was not a serious issue, since consumers had no chances of switching to another operator. Then, after 1998, everything changed: the safe harbor of monopoly vanished away and the unknown spectrum of competition materialized. At that time, as anticipated, companies totally lacked marketing capabilities:

“After the liberalization, Telecom Italia had to learn how to compete; we can sum up the capabilities acquired into communication and marketing competencies, which added to the previously existing technical competencies” (Director of Multimedia Entertainment, TI).

“The mission of the company, after liberalization, was completely overturned: the imperative shifted from serving the company to serving the customers. It was high time to learn how to compete: the alternative to achieving such skills was die” (Marketing Manager, Orange)

“With Liberalization, we totally changed our business model. We had basically to build up from scratch the marketing division.” (Project Manager, Telefonica)

“Lessons learnt from the liberalization include: [1] Being able to compete on prices in a more tuff way; [2] Being more adaptive to different contingencies; [3] Being more efficient; [4] Being more ready to transition phases; [5] Being ready to change in a broader sense and boost the digitalization process. All these abilities were basically unknown to us before liberalization” (Marketing Manager, DT)

Another issue that cannot be neglected, is the generation of resistance mechanisms (Piderit, 2000), especially for Deutsche Telekom and Orange where many employees were enjoying the civil servant status in 1998. Literature shows how internal and external resistance contributed in a substantial manner to incumbents’ failure in several cases (e.g. Christensen and Bower, 1996; Tripsas and Gavetti, 2000). Such tension boosted also an active pressure on the existing institutions to obtain more favorable contingencies, which in turn promoted the creation of dynamic capabilities:

“More than 42% of employees before liberalization were public employees, with the civil servant status [i.e. many additional benefits], therefore liberalization, privatization and competition were seen as threat for their status. A slow adaptation process followed, with a period of mediation in the 2000s, when many employees, managers included, were dissatisfied, and exited the Orange workforce. Later, with Stéphane Richard covering the CEO position, employee satisfaction raised up, with many employees who feel nowadays proud to work for Orange”. (Project Manager, Orange)

“Many employees at that time had the status of civil servant, and some of them still maintain it nowadays; therefore liberalization was not so welcomed.” (Product Manager, DT)

“Thanks to technical advancements, we assisted to less job specialization: before we required many technical people specialized in one specific task. What we need today is of course technical people, but competition pushed the necessity of having on board also commercial and administrative employees. OTTs entry reinforced even more this phenomenon: the company is mainly organized around consumer products which are continuously changing, it is very difficult to keep pace. We are selling contents to do not simply be a supplier of connectivity. There was also a change of management

focus: a challenge for Orange, for example, was to teach commercial skills to civil servants, who must be maintained in the organization by law.” (International Participations Manager, Orange)

Reaction to such exogenous shock was not exactly the same for all the four companies, but there are many similarities, especially for what concerns the final outcome. The first response of Telecom Italia to liberalization consisted of (1) shifting from marketing of tariffs to marketing of services; (2) bundling strategy; (3) enhancing customer care. The firm also had to learn how to deal with the regulator and speed up product development. To achieve all of this, new dynamic managerial capabilities were required, in order to mediate the relationship between changes in the organizational context and strategic change (Helfat and Peteraf, 2015). The firm hired people who had experience working for companies that operate under competitive regimes, particularly experienced marketing managers. Further, Telekom Italia leveraged its international experience, reapplying some of the processes it previously developed abroad. Finally, process knowledge, which had been developed through the convergence between the fixed and mobile divisions, was leveraged:

“Thanks to the international presence before liberalization, the company had a previous taste of competition in other markets that are not the domestic one” (Network Engineer Director, TI).

“...From monopolist to market operator, we tried to manage such shift also by acquiring external competencies, [i.e.] hiring people coming from other market operators” (Area Manager, TI).

“A change in competencies is observable also from a marketing point of view; in fact, after liberalization, the sales force became more specialized [...]” (Sales Manager, TI).

“After liberalization, TI tried to reaffirm its brand as a whole, by promoting a value convergence between TIM and Telecom Italia which had its culmination with the merger between the two entities in 2005” (Marketing Manager, TI).

Orange, then, reacted to liberalization firstly by promoting more marketing initiative, and trying to move the attention toward its customers; customer retention became a key issue

as well. Moreover, R&D was globalized and tailored around the real needs of customers.

Internationalization also represented a reaction to the newly liberalized domestic market; the intention was to diversify in terms of geographical presence and acquire new competencies from experience in foreign markets:

“The services’ quality was enhanced: mobile network, fixed telephony, customer relationships, satisfaction ratio measurement are only some issues that we took into serious consideration at that time. We were willing to be the number one in France, for example the quality of transmission for voice calls, the coverage of mobile network, and information systems stability were drastically improved.” (Project Manager, Orange)

“Marketing bundling strategy represented a way to retain customers, in the spirit of convergence of different services offered.” (Division CEO, Orange)

“Internationalization was a response to liberalization; in fact the domestic market became not so stable anymore so we needed to diversify our risk.” (Marketing Manager, Orange)

Telefonica bet a lot also on its international expansion, and such strategical orientation contributed to the creation of market-related skills, which became necessary in order to operate in a liberalized market. This led to two main relevant outcomes: (1) the company had the chance to geographically diversify its risk, and (2) it had the opportunity to grasp new competences that vary from the ability of establishing alliances to the capacity of monitoring the telco industry from a worldwide perspective. A point in favor of Telefonica was represented also by the decision of remaining in some foreign market where the short-term revenues were not so satisfactory; in some case, this not implied directly more money for the group, but a consistent increase in terms of knowledge and capabilities. This is a clear example where certain actions do not generate direct revenues, but contribute to the creation of dynamic capabilities, which ultimately help firms to succeed shocks:

“After liberalization, our international presence turned out to be vital: not only did we have the chance to diversify our risk but we got also the opportunity to grasp new

competencies worldwide. This revealed very useful also to face OTTs.” (Tech Strategy Director, Telefonica)

“Internationalization continued at a fast pace after liberalization. In fact, we survived in countries where the situation was not so easy and this helped a lot in the future.” (Program Director, Telefonica)

“A deep boost of internationalization, put in action mainly through acquisitions, was the answer to such threat [i.e. liberalization], to face internal reduction of market shares. In Latin America Telefonica became a global operation, while in many EU countries like Germany and UK had the shape of a local operator. To sum up, the answer provided to the increased competition in Europe of Telefonica was to grow all over the world through accurate M&As.” (Training Manager, Telefonica)

Looking at the specific capabilities acquired and processes changed by Deutsche Telekom as a consequence of liberalization, we evidence how the company increased its investments in customer oriented R&D, striving to achieve a more market-centered approach, and promoted internationalization as a way to benefit from scales and explore new markets to learn.

“Being a monopolist resulted in less investments in R&D and innovation; when you are alone there is no reason why investing money in being better than whom?” (Product Manager, DT)

“The introduction of customer satisfaction among our KPIs evidences the willingness of the company of be more customer centric at the time of market opening.” (Area Manager, DT)

“Internationalization also was boosted as a consequence of liberalization. In particular, DT involved new capital in different countries in the Middle East, Europe, Russia, and US. Regarding US, this choice reflected a willingness of being present in a more profitable market (compared to EU), less segmented and where scales could work.” (Site Procurement Manager, DT)

Hence, we are able to conclude that liberalization challenged the status quo of all the four former monopolists. They reacted by developing second order R&D and marketing capabilities, mainly through external hiring, internationalization, by acquiring and establishing alliances with foreign firms. As previously shown, there are some individual differences that will be summarized at the end of the findings section.

Over-the-tops

OTT was a bigger challenge than liberalization, as almost unanimously interviewed managers confirm. In fact, while after the liberalization former telco monopolist had to face other telco companies, here the same firms were challenged by new entities that do not have the typical traits of telcos. The first reaction of the four companies, after a brief period of phenomenon ignoring, was generally very harsh: firms tried to monitor internet traffic and block the one generated by OTTs, then attempting at legally requiring OTTs to recognize them a fee for using their network infrastructure. Such strategy did not work (with a slight exception for Orange, where the telco managed to receive a small fee from OTTs for the generated traffic); thus, former monopolists moved to a “coopetition” model. Rather than blocking OTT traffic, they facilitated such services and established partnerships with “the enemy”. Telecom Italia managers depict this evolution in a clear manner:

“The strategic reaction to OTT was first more competitive in nature: we attempted at creating new similar services. Then, we understood that this was not the right way and we started to establish commercial alliances. We missed a global vision at the beginning, but we have been able to recover” (Manager of Open Innovation & Research, TI).

“Nowadays, Telecom Italia tries to recognize the OTT traffic in order to make it as prioritized. Being aware that users are willing to experience OTTs fully working, TI tries to provide such excellent service, better than its [telco] competitors: telco operators came back to compete among them and not against OTTs” (Network Engineer Director, TI).

Orange, instead, despite also concluding its strategy evolution process with several agreements established with OTTs, insisted more, from a legally standpoint, in claiming a fee from OTTs to use Orange’s network infrastructure. The firm managed to receive a small fee, and this represented a success:

“We faced OTTs according to three main distinct phases: (1) Try ourselves to be an OTT as well, by conceiving similar services; this was not successful, OTT are global in nature. (2) Get better in operations, by reducing costs and increasing our overall value; this helped to gain efficiency, but still not represented the final solution; (3)

Defend ourselves, by legally forcing OTTs to pay a fee for using our infrastructure; This was a success, at least from a conceptual point of view. In fact, now OTTs are recognizing us a fee, which does not reflect the real value they get from us, but still is something. Anyway, in the future, the relationship with OTTs will be more cooperative, also in different sectors like banking, we must establish many partnerships in the next five years.” (Digital Strategy Manager, Orange)

“[It] was a clear disruption: due to technical advancement, the pricing and profits schemes became for the first time different, there was a mismatch between our costs and what we earned. For example, long haul call prices must be lowered, although the infrastructure to support such calls was very costly. OTTs reduced the value of both distance and time.” (International Participations Manager, Orange)

The Spanish former monopolist, on the other hand, managed also to share some costs for maintaining their infrastructure, but this was achieved through negotiation rather than lawsuits. The strategic evolution of Telefonica can also be identified in the previously mentioned three-step process, and at the end the firm managed to sign important alliances, such as the partnership with Netflix:

“OTT reaction can be divided in three stages: Firstly, we simply ignored the phenomenon; then, it came the time of resistance and harsh reaction, by trying to block the traffic and acquiring start-ups in the field for earning capabilities and eliminate competitors. Such strategy turned out to be really ineffective; finally, the integration phase: we attempt at establishing partnerships with OTTs. An example of such change of strategy was the enormous time spent at considering the best monetization strategy for a partnership with Netflix.” (Technology Manager, Telefonica)

“The initial impact with OTT was dramatic. We were spending a lot of money in submarine wires, and then Google pretended to use them for free. We threatened OTTs by hypothesizing a block of their traffic. Things changed and nowadays there is more cooperation. For example, we share some costs with Facebook.” (Universitas Telefonica)

Deutsche Telekom followed an evolutionary path from a strategic point of view that is similar to the one of Telecom Italia: the German firm first tried to fight OTTs, then to substitute them, and finally the telco operator managed to set alliances and agreements with the new entrants:

“The reaction of DT to OTTs had three stages: (1) Harsh competition: we tried to block their traffic and fight them; (2) Attempt at developing new products aimed at

furnishing an alternative to customers, in more "normal" competitive spirit; (3) Finally, we acknowledged that OTTs are here and won't disappear in the near future. Therefore establishing alliances rather than fighting them represents the best strategy to adopt. Now we are establishing many partnerships with OTTs, aware that one day we won't sell our services anymore [i.e. only a network provider].” (Supply Chain Manager, DT)

Such discussion represents a broad view of the phenomenon complexity: telco operators, recently hit by competition, all of a sudden had to face new entities like OTTs, which were completely unknown in terms of value proposition and business strategy. In slightly different ways, all the four firms managed to succeed also this second challenge. Hence, it is extremely interesting for the sake of this research to see how these companies survived the shock and whether liberalization or, more specifically, second-order capabilities developed during liberalization, played a role.

To successfully compete in this new environment, firms had to alter their resource base once again. Newly generated skills range from customer-centric ability, digital and IT competencies, new business model and value proposition, capacity to establish fruitful partnerships and collaboration. All these new abilities also contributed to change the way R&D and marketing activities are carried out:

“OTTs let Orange switch to a data-centered business: internet access became the key service provided by traditional telco operators.” (Division Manager, Orange)

“We started to diversify our business, acquiring competencies in the video, digital, IT security domains. Nowadays, all physical assets are not owned by Telefonica but by a controlled firm.” (Program Director, Telefonica)

“Now we are investing in IT in order to develop our digital capabilities; but this is just the tip of the iceberg: it’s the final byproduct of a complex process of organizational change which is still ongoing.” (IT Manager, Telefonica)

“Key competence acquired from OTTs is represented by the capacity of establishing, maintaining and profiting from partnerships.” (Marketing Manager, DT)

From Monopoly to OTTs Entry: the Evolution of Capabilities:

The next step, thus, consists in understanding how these capabilities are built, and exactly in which way they do differ one period from one another. By focusing on this specific issue we learn from archival material that companies, with some individual differences in terms of activities' relevance, were able to generate and transform the previously mentioned capabilities mostly through employees' renewal, alliances, M&As, and international expansion.

Then, in-depth interviews give us the privilege of disentangling such wide categories into more specific and narrow organizational practices, for each telco operator. On overall, key antecedents of dynamic capabilities were (1) downsizing to gain efficiency; (2) hiring of specialized personnel, mostly in the IT field; (3) engagement with consultants to develop new IT competencies; (4) establishment of a start-up accelerator that provided access to new capabilities; (5) acquisition and financing of existing start-ups; (6) strategic alliances with OTTs; (7) international expansion to Africa, Latin America, Asia, and Europe. All these activities fall in what Schilke et al (forthcoming) defined as antecedents of dynamic capabilities. However, as anticipated, individual differences exist.

Telecom Italia, transitioning from the monopoly era to the liberalization one, started to hire employees coming from other market operators, promoted marketing course to train engineers, learnt practices that were successful in foreign contexts where the market was already competitive, established partnerships with high tech companies, and reduced the level of red tapes and bureaucracy. These activities all together led to important changes both at the R&D and marketing operational levels. In fact, R&D researchers who were previously highly skilled only from a technical standpoint, started to gain some marketing competencies. The overall structure of R&D becomes more market-driven and less hierarchical, the strong

monopolistic mentality started to give way to a more competition oriented approach, despite many inherited monopolistic traits, such as slow response time and a reduced but still consistent amount of bureaucracy remained. In a similar vein, the marketing department was almost established from the scratch. Before liberalization, only a sales department was present. Activities undertaken by such divisions also changed in a significant manner: resources allocated to advertisement were not abundant and almost only aimed at promoting the use of the telecommunication service itself. Then, after liberalization, Telecom Italia allocated more resources to marketing, and the broad scope evolved to enhance the brand reputation and the overall perception of the company.

Then, when the second shock occurred, the company both leveraged the knowledge acquired during the liberalization era and also generated new dynamic capabilities thanks to several strategic actions. Such actions include cooperation and agreements signed with universities and other research entities, development of existing infrastructure, releasing of more flexible strategic plans that already embed the possibility of changes and adjustments, partnerships with OTTs themselves, consolidation of the Brazilian subsidiary. These activities, together with the existing dynamic capabilities generated during the liberalization, promoted a further shift in the R&D and marketing paradigm. From a cultural perspective, the monopolistic traits reduced even more and the company demonstrated to be able to compete on a deregulated market. Researchers started to share research efforts with institutions and even other private firms, especially for what concerns the basic R&D; moreover, many features of open innovation were adopted, such as considering customer driven improvements. The structure became less formal and more horizontal. Marketing employees focused mainly on retain and attract customers, resources dedicated to marketing activities became more targeted for specific projects that were reputed as highly relevant for the

competitive advantage of the firm, marketing managers attempted at putting the customer at the center.

“The commitment to bring those infrastructure investments to term will be matched by efforts to boost innovation and demand for new digital services...and provide financial and management support to new initiatives such as the working capital project, postgraduate funding for doctoral and master programs, and major applied research projects carried out within Telecom Italia’s facilities” (AP 2013, TI)

“Telecom Italia labs for R&D represented a strategic asset to survive and to continuously innovate, mainly for explorative purposes. Start-up incubators also allowed us to benefit from a fresher mentality, an intangible renovated way of doing business, and a greater ability to be closer to customers’ needs. Without any doubts, these assets helped us to better face the OTT challenge.” (R&D Manager, TI)

An example of how specific actions led to the development of dynamic capabilities is represented by the agreement with Sky Italia: Telecom Italia had the chance to offer TV contents and internet service in bundle and observe from a close point of view the marketing strategies of a media company:

It is precisely the technological level reached by the networks, together with the confirmation of new forms of consumption demonstrated by our customers, which have led us to take an important step: the merger between TIM and Telecom Italia...we intend to concentrate our efforts and our investments will be the development of innovative services and the strengthening of our international presence... The merger between TIM and Telecom Italia will not only ensure the unitary government of business processes which are in continuous and often turbulent evolution, but will make it possible to create considerable synergies in terms of investments and operating costs. (AP 2004, TI)

In an environment of persistent price pressure and rapidly increasing demand for data services, Telecom Italia has embarked on a course of action revolving around rapid and widespread infrastructural development. This supported the potential growth in demand for data services and, as a result, shifted the competitive dynamic onto key factors that provide a structural advantage (in particular: quality, speed and comprehensive coverage of our networks)...More than ‘just’ a telecommunications operator (a transporter of bits of information...), from now on Telecom Italia shall increasingly be a ‘Smart Connectivity & Service Provider’. This transformation means we will have to enter a space that is already inhabited by other Over The Top providers (OTT), who offer services delivered using the Internet, but are not telecoms operators themselves (AP 2014, TI)

Figure 3a and 3b graphically represent the evolution of competencies for Telecom Italia, respectively related to R&D and marketing, and the antecedents of dynamic capabilities which, in turn, made such change happen.

Figure 3a. Key Telecom Italia Findings – R&D.

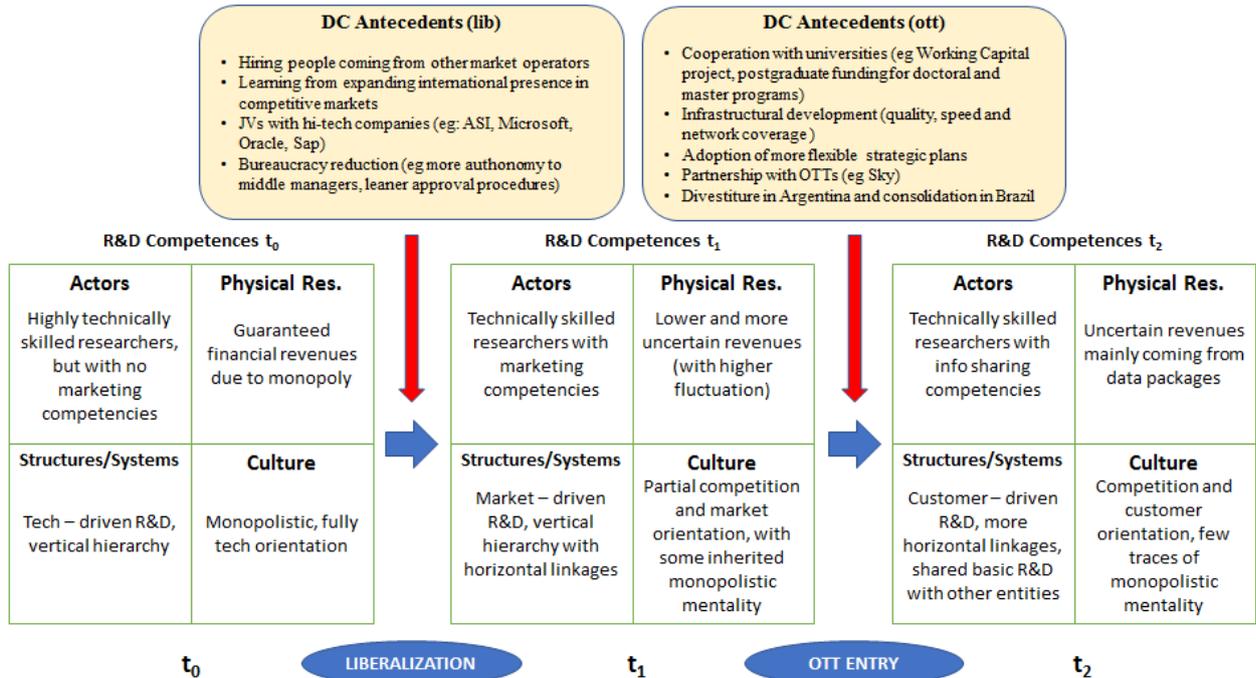
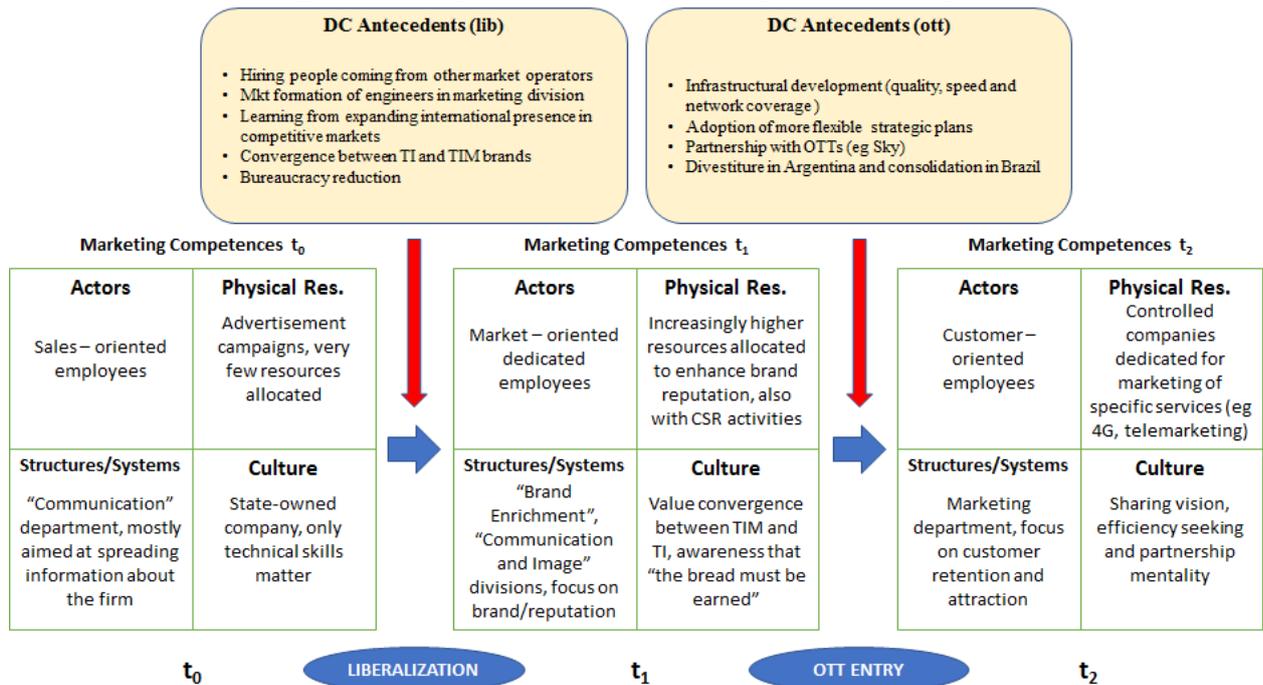


Figure 3b. Key Telecom Italia Findings – Marketing.



Orange, after liberalization, bet more on the training of existing employees and hiring new ones, rather than on substituting them. Such strategic choice was also dictated by the constraint of having many civil servants. Then, the French former monopolist started to open new research center around the world in order to promote a globalization process of R&D; in a similar vein, Orange also promoted an international expansion, especially to those African countries which were formerly French colonies. Further, many alliances and promotions of sport events were undertaken with the final aim of improving the brand reputation and visibility. Finally, the overall information system infrastructure has been re-engineered, in order to allow a faster and more effective internal information exchange; such action contributed to make the structure more horizontal. From a R&D standpoint, Orange also tried to have a more market oriented structure similarly to Telecom Italia. However, the French operator after liberalization has more dispersed R&D labs, which communicate and promote research activities in a decentralized fashion. For what concerns marketing, Orange also adopted a market oriented vision like Telecom Italia, with the difference of concentrating more on customer retention, implemented mainly through bundling strategy (fixed, mobile, internet inclusive packages).

Then, when the second shock occurred, Orange kept on expanding internationally, and hired new employees, contributing to reduce in percentage the amount of civil servants. In addition, the company also promoted employees rotation among subsidiaries programs, with the intention of enriching their competences, and several start-ups' incubators were financed, also in different industries such as finance. In a similar vein, some infant firms have been acquired, and also in this case not all acquired start-ups were belonging to the telco sector. Results of such activities are represented by a R&D division which may benefit from knowledge generated by young start-ups and a less hierarchical structure. Culture evolved to

an even more customer orientation and a sense of relying on institutions, promoted by the symbolic victory on OTTs represented by the payment of a small fee for using telcos' infrastructure. From a marketing perspective, Orange started to concentrate also on new customers' acquisition and more additional resources were allocated to the enhancement of customer satisfaction.

“Internationalization helped to gain competencies useful to face OTTs worldwide. (Division CEO, Orange)”

“From the early 2000s we started to buy many companies with the final purposes of diversifying our risk and have a more privileged view of what was happening worldwide . (Marketing Manager, Orange)”

“Our international presence represents one of the keys for success on OTTs. In fact, the experience gained thanks to the several partnerships accomplished all over the world is turning out to be extremely precious for conceiving strategic alliances with OTTs” (Business Services Manager, Orange)

“After liberalization the company kept on hiring new people, this was very important to help changing the former organizational mentality of monopolist toward a more change-ready firm. We moved from a company characterized by many civil servants who did not conceive the word disruption to a firm which is properly facing a very serious phenomenon like OTTs are” (Project Manager, Orange)

Figure 4a and 4b graphically represent the evolution of competencies for Orange, respectively related to R&D and marketing, and the antecedents of dynamic capabilities which, in turn, allowed the firm to experience such evolutionary path.

Figure 4a. Key Orange Findings – R&D.

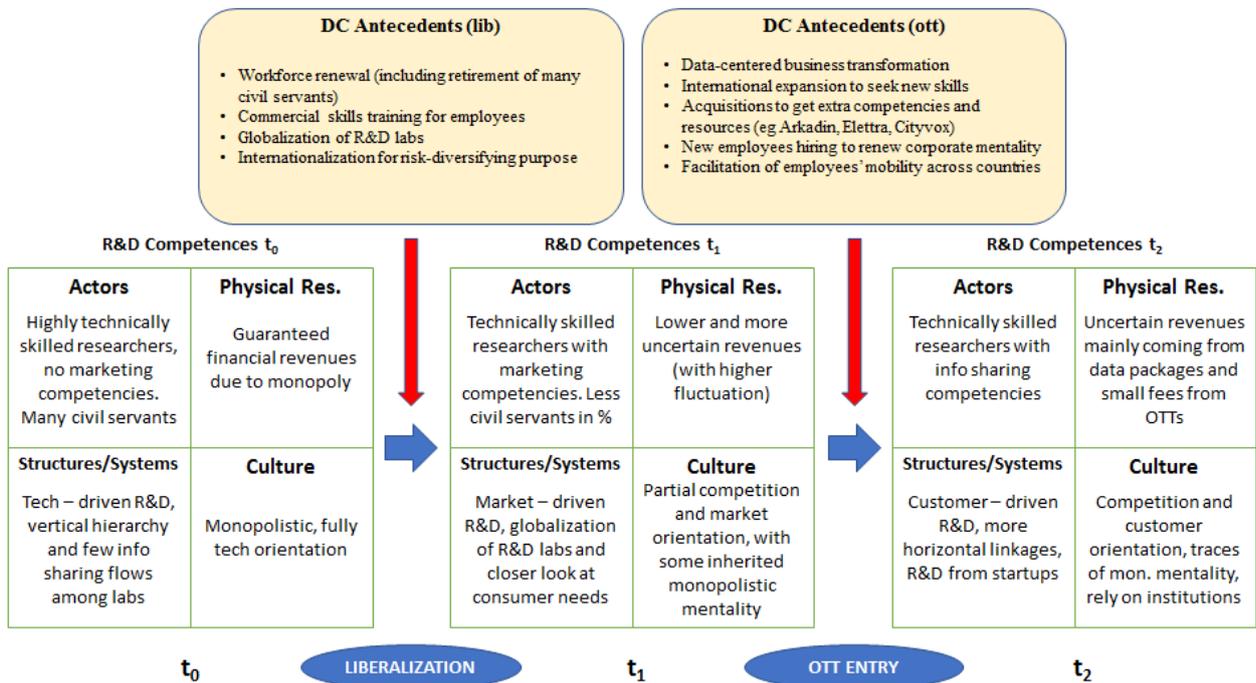
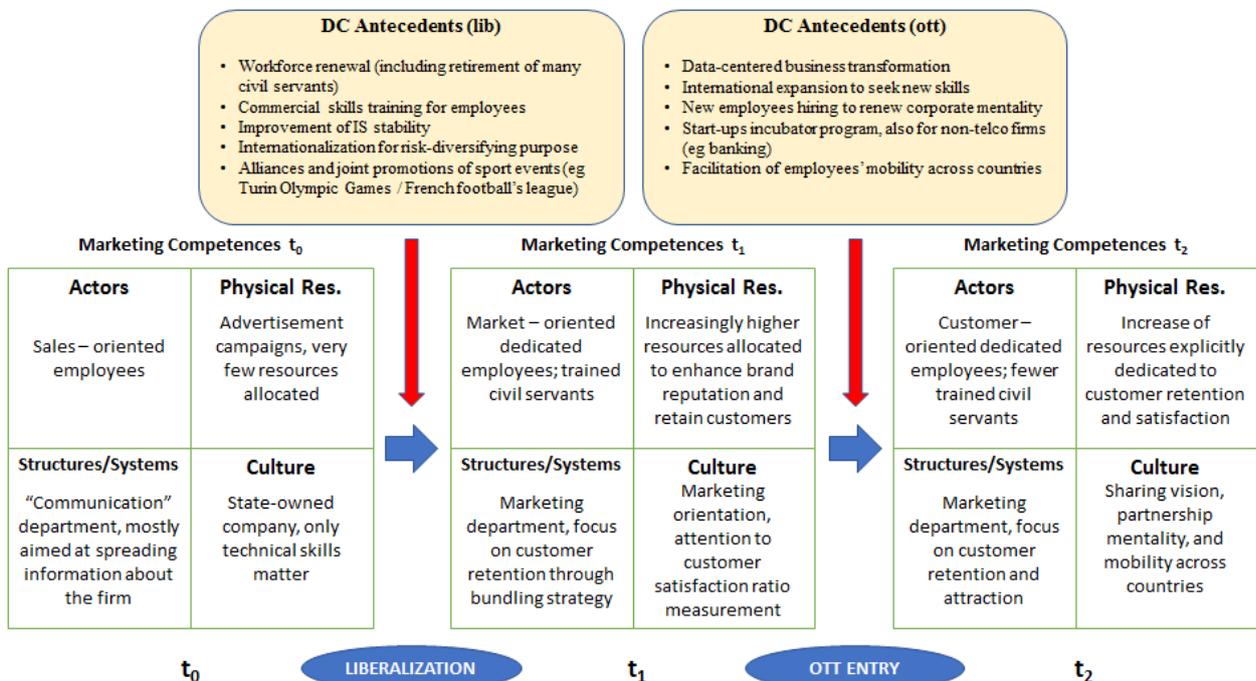


Figure 4b. Key Orange Findings – Marketing.



Then, Telefonica, after liberalization promoted a business model renewal according to a leaner and less hierarchical fashion, accomplished strategic alliance for the development of

broadband, started to hire employees who experienced competitive markets, and, most importantly, the Spanish former monopolist adopted a massive internationalization strategy, both through acquisition of foreign telco operators and with the establishment of new companies from the scratch. Such actions represent the antecedents of dynamic capabilities which, all together but in a different manner, helped to change the capabilities bulk of the telco operator. More specifically, from a R&D point of view, Telefonica moved from a situation where researchers were technically very skilled but lacking marketing competencies and a tech-driven R&D model, to a more horizontal structure and people employed at the R&D department trained from a marketing standpoint. The culture changed, and there was a commitment to innovation which became also the company's slogan. The way of conducting R&D activities started to follow a more market-driven paradigm. From a marketing angle, we also assisted to a radical transformation of the core company specific skills and procedure.

Before liberalization, in fact, the scenario was almost the same of the one observed in Telecom Italia: an almost full concentration on technical aspects, a focus on sales, and advertisement campaigns conceived with the only purpose of enlarging the customer basis. The only difference with Telecom Italia in this regard, is that Telefonica had a greater presence worldwide also before liberalization, and hence such campaigns were promoted in different countries. After 1998, the Spanish firm established the "Marketing and Content" division, replacing the previous "Telefonica Publicidad e Informacion"; such change was not only a matter of labels, but it embeds a series of modifications which can be summarized in a market orientation and more resources allocated for promoting the brand and enhance customer satisfaction.

Furthermore, when OTTs entered the market, Telefonica established several partnership with them, hired people with differentiated competencies that vary among, video,

digital, IT, and cybersecurity. The Spanish operator also decided to further expand its international presence worldwide, to cope with entities (the OTTs) that are considered as global in nature: in fact, such new competitors, as mentioned in the intro section, do not have physical boundaries determined by network infrastructure. Telefonica, in addition, promoted several start-ups accelerators, accomplished some acquisitions of young innovative start-ups, and renewed its IT infrastructure, making it more effective and supportive. R&D activities started to benefit from the knowledge spillover coming from start-ups acquired and supported, the focus of such projects became even more concentrated on the real customers' needs, and the company promoted many formal and informal occasions to exchange ideas between R&D and marketing departments. Regarding the latter, it addressed a more tailored advertisement model and customer satisfaction as inserted in the company's KPIs list as a crucial indicator.

“We tried to expand our international presence consequently to the proliferation of OTTs because they are global in nature, and we wanted to catch up about this issue.” (Technology Manager, Telefonica)

“Examples of this strategic approach are a partnership with google for what concerns big data monetization (they buy our data), partnerships with Spotify, Snapchat and Dropbox. We also promoted an accelerator for start-ups in order to better compete with OTT: they are so fast, and as traditional telco it is difficult to compete.” (Tech Strategy Director, Telefonica)

“We also reacted by making several acquisitions. Synergic was a company acquired by Telefonica and we left as CEO the entrepreneur. We believe that this is the only way to preserve and benefit from start-ups agility and freshness.” (Universitas Telefonica)

“After liberalization, our international presence turned out to be vital: not only did we have the chance to diversify our risk but we got also the opportunity to grasp new competencies worldwide. This revealed very useful also to face OTTs.” (Tech Strategy Director, Telefonica)

“Internationalization continued at a fast pace after liberalization. In fact, we survived in countries where the situation was not so easy and this helped a lot in the future.” (Program Director, Telefonica)

Figure 5a and 5b graphically represent the evolution of competencies for Telefonica, respectively related to R&D and marketing, and the antecedents of dynamic capabilities which, in turn, allowed the firm to accomplish the transformation in term of ordinary capabilities' bulk.

Figure 5a. Key Telefonica Findings – R&D.

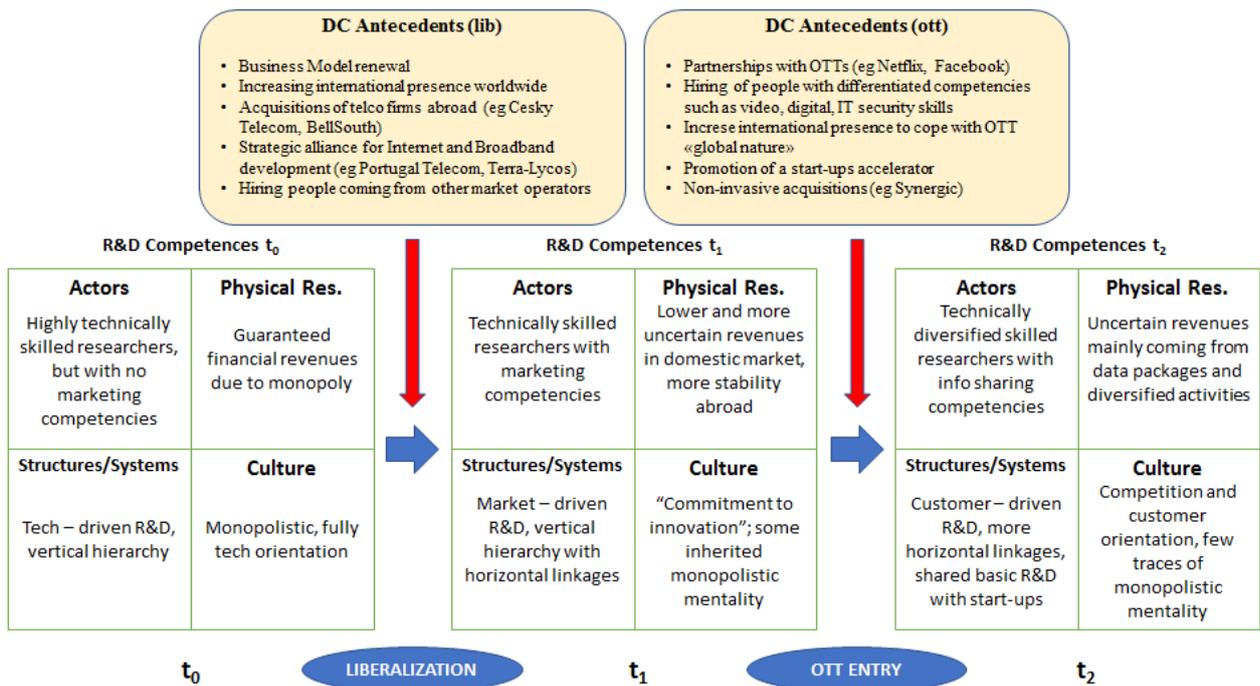
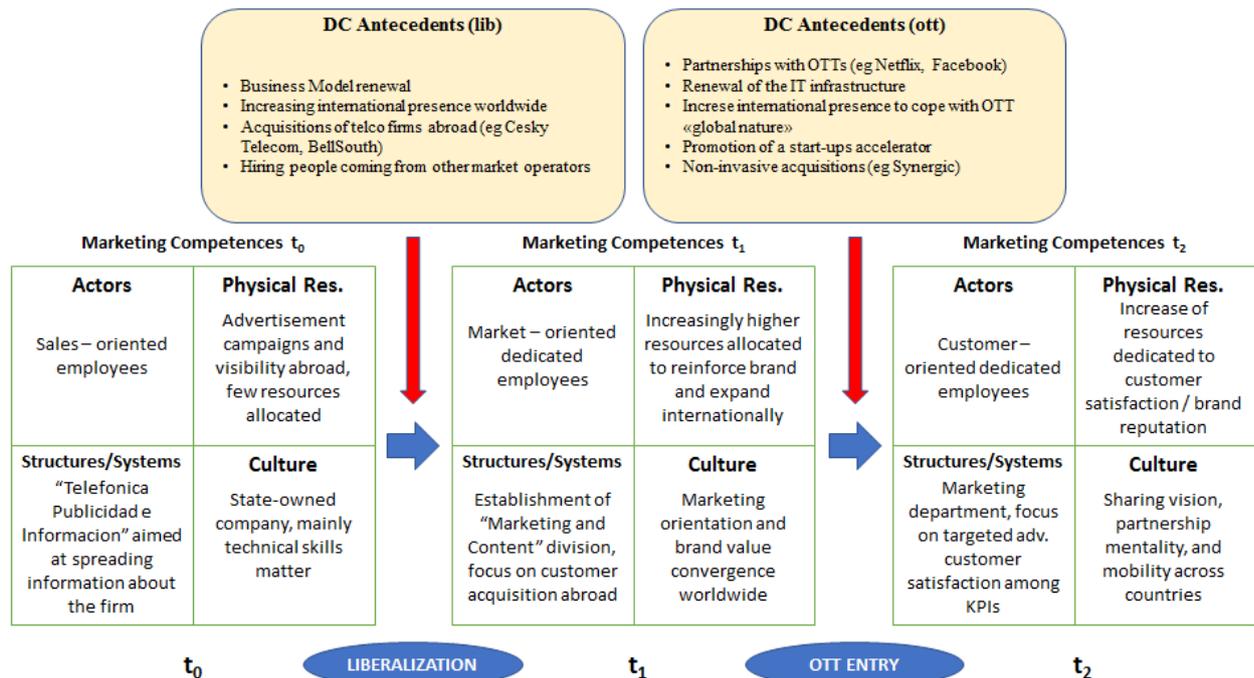


Figure 5b. Key Telefonica Findings – Marketing.



Deutsche Telekom, as anticipated, shares the issue of civil servants with Orange and thus, in a similar vein, also the German firm decided to invest more resources for training existing employees rather than replacing them. Nonetheless, retirement of older workers allowed some turnover, allowing the firm to hire people who experienced competitive environments in the past. After the liberalization of the market, the former monopolist introduced also the indicator “customer satisfaction” among its KPIs list, and increased its international presence to the Middle East, Europe, Russia, and the US. The marketing department was enlarged and restructured.

Such initiatives undertaken had effects both on the R&D and marketing competencies. In particular, the structure of R&D was the typical of monopolists, employees were technically skilled but lacked marketing capabilities, the structure was vertical, and there were few linkages among existing lab. Such situation changes after the liberalization; in fact, R&D workers became more skilled from a commercial standpoint thanks to training activities, the

structure became more market oriented but it still reflected a waterfall model, some inherited monopolistic traits remained from a cultural point of view. Marketing before liberalization was essentially sales oriented, there was a communication department with the aim of spreading information about the services offered by the company and the few dedicated resources were almost uniquely used for advertisement. After 1998, Deutsche Telekom started to rely on a marketing department, which was composed by trained civil servants and some newly hired employees. Team working and communication across teams was encouraged, and a more horizontal structure contributed to generate a more collaborative climate. Resources dedicated to marketing related activities raised, and such funds were mainly used to enhance brand reputation and retain customers, who were switching to competitors.

Then, when OTTs entered the market, the German former monopolist fostered the mobility of employees across countries, promoted several alliances with OTTs themselves, such as Sky and Netflix, established partnerships with hi-tech companies, moved from a waterfall to a software-oriented business model, internationalized its management board, and reduced bureaucracy. Such antecedents of dynamic capabilities had consequences on R&D and marketing related competencies. Indeed, the R&D orientation went even more toward a market oriented paradigm, the newly implemented software oriented business model contributed to instill a more horizontal and sharing culture, few traces of monopolistic mentality remained, but they are almost vanishing. The marketing department was empowered, and it spent many efforts to retain and attract new customers. Resources were specifically addressed to enhance both customer retention and customer satisfaction.

“Employees started to be rotated among the international subsidiaries of DT, in order to open their minds and learn new ways of operating.” (Site Procurement Manager, DT)

“There is nothing that prevents us to use the same agile model of OTTs, but there is both resistance from employees (cultural aspects) and from the financial department:

in fact, many changes, although necessary, do not bear fruits immediately and in terms of NPV is not possible to measure them in the short run. Fortunately, in the last period such transition is happening...last period was characterized by many alliances and partnerships which are helping to change” (Optical Architecture Manager, DT)

Figure 6a and 6b graphically represent the evolution of competencies for Deutsche Telekom, respectively related to R&D and marketing, and the antecedents of dynamic capabilities which, in turn, allowed the firm to accomplish the transformation in term of ordinary capabilities’ bulk.

Figure 6a. Key Deutsche Telekom Findings – R&D.

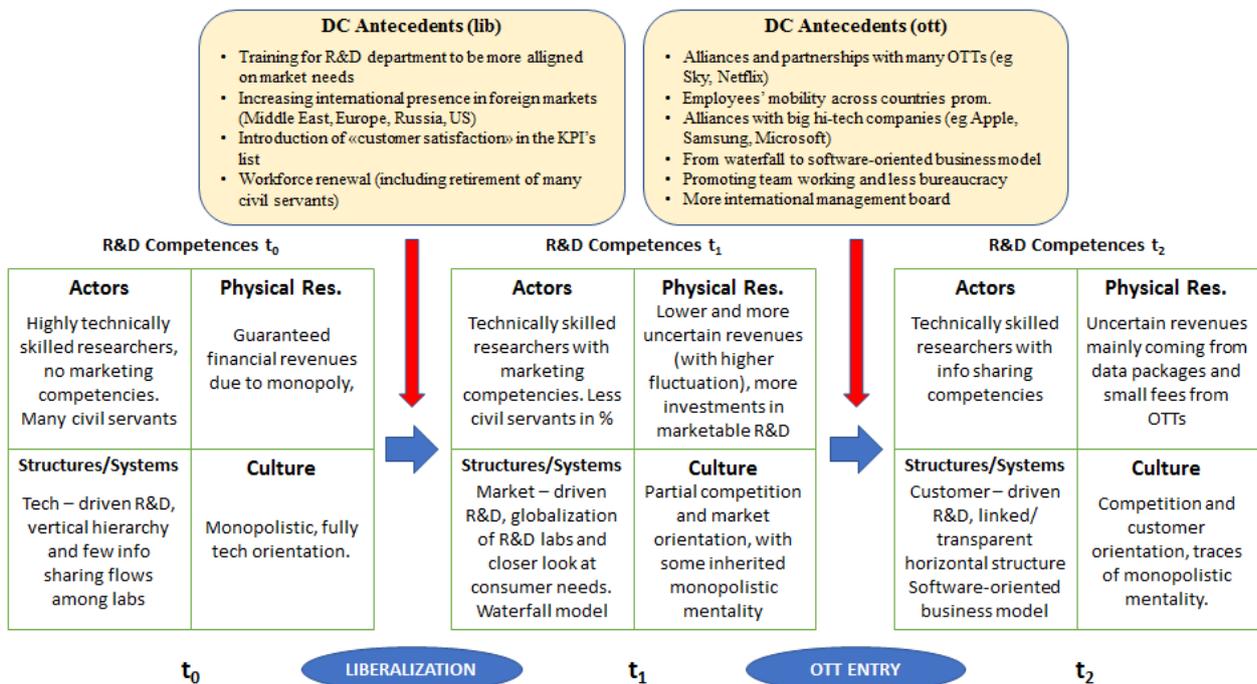
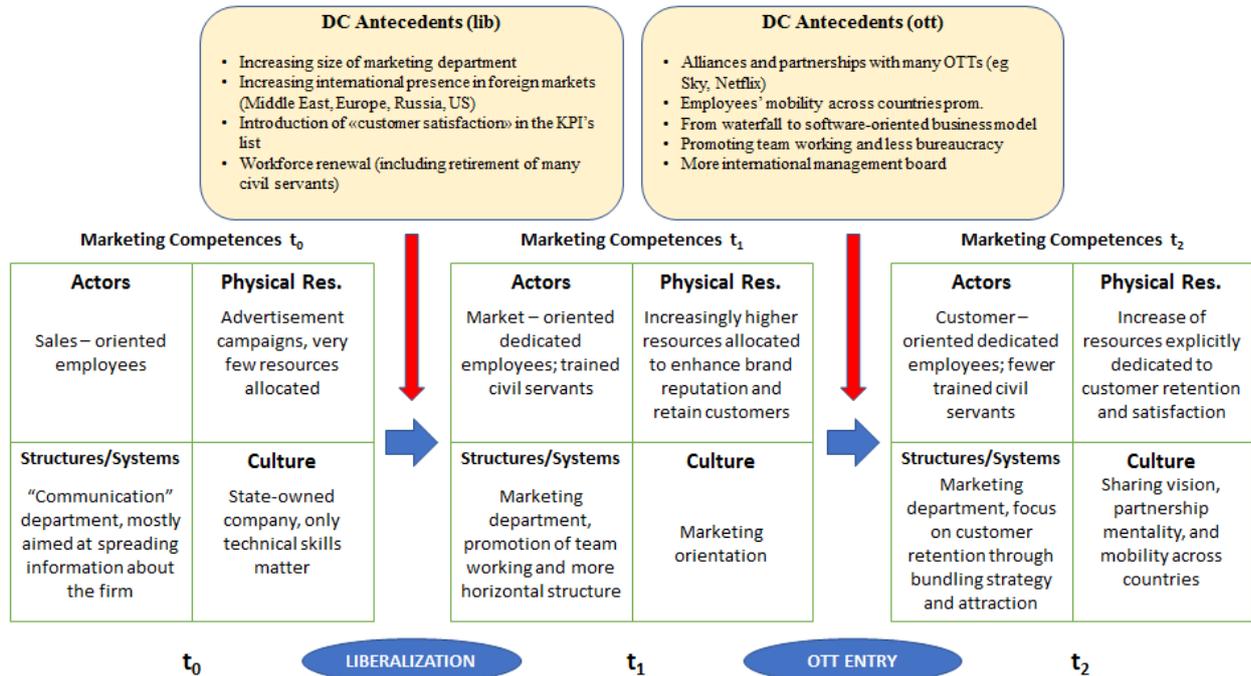


Figure 6b. Key Deutsche Telekom Findings – Marketing.



Differences among Firms:

At this point, for the sake of clarity, we consider it worthwhile to summarize and highlight key discrepancies from a strategic point of view regarding the four focal firms. As anticipated, differences are not very prominent, and still led to a similar scenario in terms of core capabilities detained at each period. After liberalization, key differences in terms of strategic action carried out are essentially three. First, Orange and Deutsche Telekom experienced more difficulties in hiring new people compared to the other two, and this implied a heavier investment in training activities for actual employees. Second, from an internationalization perspective, Telefonica and Deutsche Telekom were very active; slightly less Orange and substantially less Telecom Italia. However, this latter established more agreements with other companies to acquire new skills. Third, from a marketing standpoint, while all the operators made huge efforts to get closer to customers, Orange attempted to promote its brand more in relationship with sport events, while the others diversified more.

Then, considering the second shock, the key difference is represented by a slightly more aggressive behavior of Orange toward OTTs. In fact, while a first harsh reaction is common to all the considered telco operators, Orange was the only one that continued to legally claim a small fee from OTTs for using its network infrastructure. Other minor differences include a de-internationalization process of Telecom Italia, and a radical change of the business model by Deutsche Telekom.

The fact that despite some differences in the strategic path followed exist, but the final outcome is very similar, suggests that we are observing an equifinality scenario (e.g. Doty et al, 1993; Gresov and Drazin, 1997).

Thus, in these sections we have analyzed which are the capabilities used and generated consequently to the liberalization and OTTs shocks. We also preliminarily evidenced that what happened before OTTs appearance and after liberalization influenced the strategic behavior undertaken by the companies when the second shock manifested. Next steps consist in deeply focusing on how dynamic capabilities generated during the liberalization were reused when OTTs entered the market, and in which manner such findings can be generalized and extended also to future disruptions.

Synergies between Liberalization and Over-the-top Shocks

Our qualitative analysis suggests the existence of strong interdependencies between the two shocks, in terms of dynamic capabilities. Almost unanimously, interviewed managers highlight how crucial the abilities acquired during the liberalization became to face the challenging advent of over-the-tops. We identified several changes that played a major role here. First, results suggest that the switch to a market or demand driven R&D model, occurred after liberalization, represented an essential intermediate step toward the successive shift happened when OTTs entered the market.

Being a monopolist resulted in less investments in R&D and innovation; when you are alone there is no reason why investing money in being better than whom? Research after liberalization became much more focused on the needs of our customers. In the same spirit, we managed to conceive products which are not in direct competition to OTTs later on (Project Manager, DT)

More in general, liberalization also contributed from a cultural standpoint to instill an organizational change attitude: the ability itself to change the firm is acknowledged by the literature as “a cornerstone of the theory of dynamic capabilities” (Kleinbaum and Stuart, 2014, p. 354):

“Liberalization brought a spirit of change that turned out to be very useful in the future: every time there is a crisis, we collect all the lessons learnt during the past, and we find the right path to go ahead...liberalization made us more ready to change, every time that there is something new, like the OTT appearance was.” (Innovation Director, Orange)

“Without liberalization we would still live in a world with slow internet. It really helped us to step-by-step getting more agile and flexible...nowadays, the world change assumes a less scary meaning” (IP Manager, DT)

“Ability to change, competence of facing competition, and efficiency are the key capabilities acquired during liberalization that were used later on to face OTTs. These led us to realize in a quicker manner that embracing OTTs was definitely a better solution than fighting them.” (Business Development Manager, DT)

As last quote shows, another strong link between the first and the second shock is represented by the ability to operate under competitive regimes. Such competence is all but trivial for firms that have been monopolists lifelong. Teece et al (1997, p. 513) define competition itself as “a process involving the development, accumulation, combination, and protection of unique skills and capabilities”:

“Liberalization and OTT shocks present some synergies in terms of capabilities; basically liberalization moved the company from a monopoly to a competition regime, while OTTs brings new competitors, which are different in natures compared to traditional telcos” (Service Operations Manager, TI).

“Market-related competencies, understanding and fully comprehending what a competitive market is, are the capabilities developed during the liberalization period that turned out to be useful in facing OTTs” (Product Manager, TI).

“The change of monopolistic mentality, as a consequence of liberalization, was essential for the company to face the OTT shock” (Marketing Manager, TI).

“With liberalization Telefonica learnt that the bread must be earned; the company became more meritocratic and the acquisitions brought us more fresher competencies. All these competencies became very useful when OTTs knocked at door of our market.” (Program Director, Telefonica)

“Being exposed to the market and learn how to compete with other traditional telco operators during the liberalization was of great benefit for the company to arrive better prepared to the introduction of OTT services. If Deutsche Telekom was still a monopolist 7 years ago, it would have been much more difficult to face the OTT challenge.” (Supply Chain Manager, DT)

“Liberalization challenges included being more customer-centered, more efficient, and providing better services [than competitors]. OTT ones refer to a much more informed and empowered customer. Therefore, liberalization was of great help to face OTTs later on for two main reasons: [1] It gave a message of hope and proudness, so if we managed to survive to market opening, we should be strong enough to face also future challenges”; [2] although specific capabilities required are different for the two shocks, liberalization helped the organization to change mentality and remove the monopolistic traits that are dangerous when operating in ipercompetitive setting.” (Training Manager, Telefonica)

Similarly to what happened for the R&D paradigms' transition, also the strategic evolution of marketing approach seems incremental. In other words, it would not have been possible to acquire the required competencies at t_2 from a marketing standpoint, without having firstly developed the ones needed at t_1 . In fact, marketing departments were practically inexistent before liberalization since former monopolists did not have to win over any competitors. Then, when the market was opened to competition, former monopolists learnt (also at their own expenses in the short-run) that taking care of customer needs is essential to maintain a long-run profitability. New personnel with specific marketing abilities started to join teams and strategies at the top level moved in favor of a more marketing oriented view:

“From liberalization, we learnt that in order to make customers happy, you have to be closer to them. This turned out to be crucial in facing OTTs, in fact they are global in nature and can reach customers everywhere in the world; despite our strong international presence, we cannot. But, now we can leverage on our proximity, thanks to liberalization we are much closer to our customers, and this is a big competitive advantage in respect to OTTs”. (Marketing Manager, Orange)

“Liberalization generated many synergies that were useful to face OTTs later on. Among the useful capabilities, we have a better brand, a more customer-centric business model, learning how to compete, in a broad sense, and the development of a partnership mentality.” (IT Manager, Telefonica)

“Liberalization helped us to acquire customer-relationship skills. We learnt that customers are not the products. We succeeded in establishing a good relationship with our customers, this probably helped us to establish a fairly good relationship with OTT as well.” (Program Director, Telefonica)

In a similar vein, also the more efficient, entrepreneurial, and lean structure that telco operators adopted after liberalization was something that managers recognized as being essential for surviving the next shock. In fact, we must highlight that OTTs are often start-ups with a very agile and fresh mentality, characterized by a high rate of dynamism and adaptation to change. Being more similar from this point of view clearly represents an advantage for telcos. Further, also the ability to collaborate and establish fruitful alliances, which we acknowledged as being an important antecedent of dynamic capabilities, improved consequently to the first shock. Nonetheless, among managers there is discordance about this: while some of them believe that it was built consequently to liberalization and then reused later on, other ones recognize that it was only the advent of OTT that triggered the generation of such skill.

“I tend to separate the two phenomena, but the OTT arrival would have been much more devastating if the liberalization would never had pace. The firm had time to become more reactive, market opening helped Telecom Italia to be more efficient. Red tapes and bureaucracy were everywhere before liberalization, we would not have ever succeeded to the over the tops” (Pre-sales Manager, TI).

“Liberalization promoted the generation of capabilities which turned out to be useful in addressing the OTT phenomenon later on. In particular, I identify these: [1] Capacity to judge market movements; [2] Ability to negotiate with potential partners; [3] Learn an entrepreneurial style of doing business.” (Area Manager, DT)

“The liberalization allowed the generation of the following competencies that turned out to be useful in facing the OTTs: [1] ability to establish partnerships; [2] ability to compete; [3] be ready to change; [4] ability to generate innovations which are more in line with customers’ needs. (Product Manager, DT)

Finally, we have reasons to believe that such use, generation, and reuse process of dynamic capabilities does not end with the second considered shock, but it may repeat in a cyclical and continuous manner:

“Future challenges will mostly require the [...] ability to partner, which was generated in correspondence of the OTT entrance; increased attention on customers’ experience, which was a main consequence of liberalization but was also reinforced during the OTT shock; ability to change, which was a pure byproduct of liberalization.” (Business Development Manager, DT)

Thus, it seems that the two external shocks are very interconnected in terms of capabilities. For example, Orange and Deutsche Telekom learnt to put the customer at the center of its business and invest in product innovation when the company had to face with competition for the very first time. Moreover, firms were also characterized by a considerable degree of motionlessness that liberalization overturned: many employees were civil servant and the safe harbor of governmental ownership were not motivating telcos to evolve; then, when competition materialized, the organizations had to start fit and adapt to the new environmental contingencies. After 1998, many new employees joined the firms, managers accomplished several agreements with international organizations, and some start-ups have been acquired. These processes triggered the generation of new dynamic capabilities, to be reused later on, when OTT entered unexpectedly the market and started to furnish their services worldwide. Further, a bidirectional interaction between institutions and companies led to a new equilibrium status, which includes adaptation and attempts to modify the external environment.

“More than 42% of employees before liberalization were public employees, whit the civil servant status [i.e. many additional benefits], therefore liberalization, privatization and competition were seen as threat for their status...a slow adaptation followed, with a period of mediation in 2006, when many employees (managers included) were dissatisfied, and exit the Orange workforce. Later, with Stephan Richard covering the CEO position, employee satisfaction raised up, with many employees who feel nowadays <<proud to work for Orange>>” (Facility Manager, Orange)

“If you ask me to summarize last 25 years, I would say that after liberalization we strongly concentrated on product innovation and, more broadly, investing on whatever made us more appealing to customers, now they have the power and we want they choose us... all of a sudden, when they say that you have to liberalize, you just want to put your money away from that market. So we grew internationally, through alliances and acquisitions. This made us more flexible and dynamics. All the collected experience allowed us to switch to a data-centered business model when OTT came. Bundling was another strategic reaction to losses in the voice and sms businesses.” (Manager of Deutsche Telekom Capital Partners, DT)

Internationalization related activities also appear as being important antecedents of dynamic capabilities:

“Liberalization, and hence operating on a competitive market allowed to provide to a faster dynamic response the OTTs phenomenon [...] The presence of alternative telcos changed our existing competences. Furthermore, the internationalization experience has been very fruitful to understand how regulation works in other countries. We have been evidence that regulation in other countries is lighter than in Italy; for example, in France the regulatory approach is to not regulate the optical fiber, while in Italy it is heavily regulated. Such knowledge helped us to ask Agcom to apply a softer regulation. Experiences abroad served both as benchmark and as capabilities exchange. If OTT have come before liberalization, the impact would have been likely more disruptive: being on the market helped us to respond quicker to changes of various nature.” (International Regulation Manager, TI)

“What was really crucial after liberalization is that we started to expand internationally over Europe and worldwide. This gave us a different perspective. We also began to renew our employees’ workforce, the new generation is much more open to new challenges and dynamism. Civil servants were much more static, they started to work and know what to do till they get retires...internationalization brought different mentality and new competencies, such as enabling team working and promoting a more horizontal and transparent organizational structure.” (IT Project Manager, DT)

“Going abroad meant to reason as an alternative on a business where we have always been incumbents. For example, in Chile we acquired an operator which did not have a capillary presence on territory, hence we had to compete as minor player. Furthermore, in Brazil we started to build up a network from the scratch, from a non-incumbent position; we experienced a reverted situation where we were the attackers and someone else the incumbent. Such position means very different approach from a marketing and regulatory point of view. For example, in Brazil we lowered drastically prices for the mobile sector, stealing customers from the fixed market; it Italy this would have been impossible due to self-cannibalization risks. When OTTs entered the market, we benefited from the newly developed attackers’ mentality, since we did not start competition on services from a leadership position.” (M&A Manager, TI)

The strategic value of the transition from a process-oriented, waterfall organization to a more horizontal and flexible regime in Deutsche Telekom is widely recognized among employees, and adds empirical evidence on how liberalization acted as a powerful dynamic capabilities generator.

“When DT asked me to work for them, my answer was: “never, I won’t be part of a process-oriented organization.” Essentially, this is the problem when dealing with OTTs. In a waterfall, process-oriented model there is huge attention to experience and reliability; nonetheless, it is very difficult to rapidly embrace any change. A software-oriented is what we need if we want to understand the end-to-end world; it is a much more agile model, it enables to learn from mistakes and promotes a culture of positive failures. This is the transition we must accomplish, but, figuring out us in marathon, we just run the first kilometer. All teams need to work together, since we are talking about a real cross-functional transformation.” (Optical Architecture Manager, DT)

The fact that the stock of dynamic capabilities developed during the liberalization has been reinforced and augmented by several activities before the market entry of OTTs is recurrent during our managerial interviews. More specifically, again antecedents such as internationalization, human resources exchanges, and M&As played a key role:

“The hard competition [brought by liberalization] was the key factor that allowed us to gradually become more ready to change and to adapt new environments. After liberalization, we had no profits for long time, and so we became that we had to learn something new, there was an enormous pressure for being more lean and efficient. Internationalization for sure was an important element in this scenario; we learnt a lot one another, for example the experience of the mobile market in US was important to learn how we can attack new markets. Definitely more international management board, more exchange of people, more international presence, reinforced and enhanced what we learnt after the liberalization.” (Value & Efficiency Manager, DT)

“Each country has different challenge to take, and being international means to learn a lot. Then, entering new sectors like banking pushed to shape and change our processes: selling banking products is very different than selling telco ones. We had to learn to move from a pure telco operator position to a multiproduct company. This attitude revealed to be very useful when we had to enter the multimedia business and provide contents to face OTTs.” (International Participations Manager, Orange)

“We have a strong attention toward new innovative start-ups, we are helping them growing and succeeding. We have a start-up program, and one project is related to entering the banking sector: also thanks to it, we are gradually becoming more open in terms of different skills and innovative ability.” (Innovation Promoter, Orange)

“International presence gave us not only an increase in reputation, but also helped us to adjust our leadership style. We learnt from practices common in other countries and we shared ideas. Markets are not the same, it is important for the group to be worldwide in order to taste different approaches[...]Orange promotes international exchanges of human resources in order to acquire new skills. We have many programs that facilitate the mobility of employees across borders. This is also good for the brand image and the enterprise more in general.” (Digital Content Manager, Orange)

“After liberalization we had to increase our marketing capabilities and sensibly improve our workforce. We did it mainly by hiring people outside[...]all these capabilities became useful and positive to face OTTs. Internationalization had a double purpose. From one side, it allowed us to geographically diversify the business risk when in Europe things were not going very well. Secondly, from a learning perspective, it was very important also to realize in what we were good and in what not. For example, we learnt that when we bought assets of companies that were not performing very well, we managed to revert the situation. Then, when we attempted at developing new ventures abroad, the greenfield approach did not work very well.” (Top Executive, Telefonica)

“Trying to anticipate the change and transform it into something that can address future challenges: anticipation and transformation skills are the most important capabilities in our industries. Competition helped to develop those, and the OTTs entry contributed to learn how to handle the competition/cooperation trade-off. International presence was essential to know and improve which are our weaknesses. All together will be surely crucial to meet future challenges.” (Top Executive, Telefonica)

“During the liberalization, Telecom Italia was very committed to expand internationally, in Latin America, India, China, and Europe. The aim was to diversify the risk and react to the domestic competition. Several projects went in this direction, like Bharat, with the aim of developing fix network in India and Euskatel, a participation to promote new infrastructures in Spain. All these projects have been gradually abandoned due to cost saving necessities. However, understanding how near worlds work is crucial to understand also OTTs [which are global in nature]. In particular, marketing and R&D strategies took an advantage in terms of open-mindedness triggered by post-liberalization international expansion. Strategies became more flexible, 25 years ago “long run” was defined as 20years: now talking about strategies for next 20 years is simply crazy!” (Premium Services Manager, TI)

“Liberalization allowed us to understand how to convert competitors into partners. In fact, the establishment of the wholesale division after the liberalization permitted to make revenues from renting our network infrastructure to competitors. In a similar fashion, we made several alliances and JVs with OTTs: we understood that partnering is often better than fighting. For example, the partnership with Sky is one of the most successful one and follow the previously mentioned logic. [...] Internationalization was also useful to understand operative weaknesses. [...] Further, TI promoted many training activities after liberalization, together with the development of linguistic-

related skills. All such competencies were useful to establish fruitful partnerships with OTT.” (Wholesale Manager, TI)

We have also empirical evidence of projects which have been initiated and/or modified as consequence of the two shocks. For example, the introduction of SAP after liberalization as organizational information system by Telecom Italia released its beneficial effects also when OTTs entered the market:

“Right after the liberalization, we started a project to introduce SAP as information system for the administrative department in order to increase processes efficiency, to promote responsibility of each employee and to renew the old monopolistic mentality. In that way we enhanced efficiency of the organization, what was done by 100 now can be done by 30. Moreover, every time there was the need of something new we were more trained, we became able to analyze situations at the project level, and we managed to provide faster solutions to problems. Such 360-degrees vision was very useful when OTTs entered the market: what we learnt was diffused all over the organization and we were able to operate in a more structured and analytic manner.” (Business Marketing Manager, TI)

Projects of brand image renewal and direct selling are also impacted by the two considered disruptions and give us the perception of how such shocks are tremendously interrelated between each other in terms of capabilities:

“Before the liberalization, in order to face the forthcoming competition, we engaged in a big project of image renewal, with the aim of improving our brand image. Practical actions include a different maintenance policy (disruption on the network actuated preferably at night time), a change of attitude regarding malfunctions (guaranteed recovery and problem solving time), a deeper attention to the young market segment. In particular to this latter, we promoted marketing activities and advertisement campaign in order to catch such population. Such issue became particularly relevant when OTTs entered the market, due to the fact that Skype, WhatsApp, Netflix have a deeper appeal for youths. Now targeting young consumer is easier for us.” (Open Access Supervisor, TI)

“The project of direct selling was originally developed as an internal function of Telecom Italia. Primary aim was to promote services offered by the company. With liberalization such activity changed: the objective gradually became to get previous customers back and hold the actual ones, and we chose to establish a series of partnership in order to realize landmarks all over the territory, with the purpose of reaching as many customers as possible. [...] Fighting OTT is nearly impossible, we needed to ride the wave: the capacity of establishing good alliances with vendors developed during liberalization became extremely useful when we had to partner with

OTTs, for example Google, which whom we promote joint services.” (Business Sales Manager, TI)

As specified in details in previous sections, despite this representation describes the overall scenario, there are some company-specific differences in how each operator handled the institutional shock, which reflect also the individual process of dynamic capabilities development and usage.

DISCUSSION

Despite the similarities that the telecommunication industry shares with the computer, photography, disk drive industries and the severity of shocks faced by firms operating in the sectors, the outcome is completely different: former European telco monopolist survived the shocks and continued to enjoy substantial market shares. This poses the question why the expected failure of the incumbent did not occur.

Our empirical studies suggest that the telecom operators developed dynamic capabilities to survive liberalization. These dynamic capabilities were partly used to respond to the even bigger challenge, OTT. Looking at key second-order competencies, R&D and marketing, companies were able to shift first to a demand-driven R&D model, and then to a customer-centric marketing approach; such transition was incremental in nature, and each intermediate step was essential to reach the next one. Repeated institutional interactions also promoted the generation of new fruitful dynamic capabilities. Companies, after liberalization, started to consider the user more as a customer: this led to a switch to market driven approach from a R&D standpoint and a transition to a market orientation from a marketing perspective. Dynamic capabilities generated at that time proved to be of great benefit for surviving both shocks. In fact, later on, other organizational practices and institutional pressure added to the

existing dynamic capabilities portfolio, and allowed former monopolists to adopt an open innovation approach and a customer centric orientation.

In other words, data reveals that each shock presents an opportunity to develop and deploy dynamic capabilities which can be leveraged subsequently. While the literature had a rich discussion how capabilities are built (e.g. Haleblian and Finkelstein, 1999; Zollo and Winter, 2002), how these capabilities are reused and augmented during stable periods received limited attention. This is a particularly challenging task when environments change infrequently (Teece, et al, 1997). The capability literature has emphasized that capabilities are tightly intertwined with actions, and embedded in the doing of a particular activity (Schreyögg and Kliesch-Eberl, 2007). We are able to show that through hiring, training, acquisitions, and international expansion telecom operators continuously deploy dynamic capabilities to modify their resource base. Once a shock sets in these activities increase in scale but they do not present a novel activity.

However, there are three alternative explanations for the survival of telecom incumbents. First, as they were state owned, it is possible that the government created a regulatory framework that suits them. Furthermore, since we claimed that repeated interactions between the regulator (institution) and the firms occurred, it might appear reasonable to believe that the pressure exerted by companies on institutions guaranteed survival. This is not the case, and we clarify how the interaction with institutions did not imply the survival itself, but it promoted the creation of new dynamic capabilities. We discussed a potential governmental help with several interviewees. They all stated that the government was determined to introduce competition and set rules that made it more difficult for them to compete against new entries. Still, former monopolists did not remain fully passive and attempted at revering unfair or very inconvenient situations:

“Telecom Italia used to pay more for calls directed to other operators compared to inverted scenarios, due to the fact that the probability that such case verifies was lower. In other words, if a telecom user calls a competitor customer, Telecom Italia has to pay a higher fee to the competitor, compared to a situation where a competitor user calls a TI customer, and the competitor has to pay a fee to TI. Such asymmetry, legally justified by the recognition that TI had the largest market share, left space to a smart business model: the Tiscali case. Tiscali received a consistent amount of money from internet calls to their providers from TI users, and they used such resources to offer free internet (remember that in 1998 there was a monthly fee to have internet). For TI this implied huge customers' losses and the reaction included the development of special numeration for internet calls, in order to distinguish them from the classic voice calls.” (Network Engineer Director, TI)

“Orange had to defend its market share, it had to learn to deal with the regulator. Orange had many limitations and disadvantages compared to competitors. For example, Orange [after liberalization] was not allowed to do advertisement for the mobile line when we sent the invoice for the fixed line. Regulator was not in our favor.” (International Participations Manager, Orange)

Another issue that disproves such alternative explanation is that financial performances for all the four telcos worsened right after the 1998. However, such regulatory intervention, indirectly, had an impact, as it triggered the development of dynamic capabilities. According to Winter (2003), the creation of dynamic capabilities depends on the costs and benefits of the investments relative to ad hoc problem solving; Danneels (2011) also points out that Smith Corona could be helped in changing their resources through external endowments, nevertheless this was inconvenient for investors. Thus, even if the government favored former telco monopolists, this does not undermine our theoretical reasoning, since the mediating factor for success would still be the development of dynamic capabilities. In addition, we can rule out the possibility that some industry specific contingencies may have determined the analyzed outcome, since several former EU monopolists in the telecommunication industry are no longer market leaders nowadays in their domestic markets.

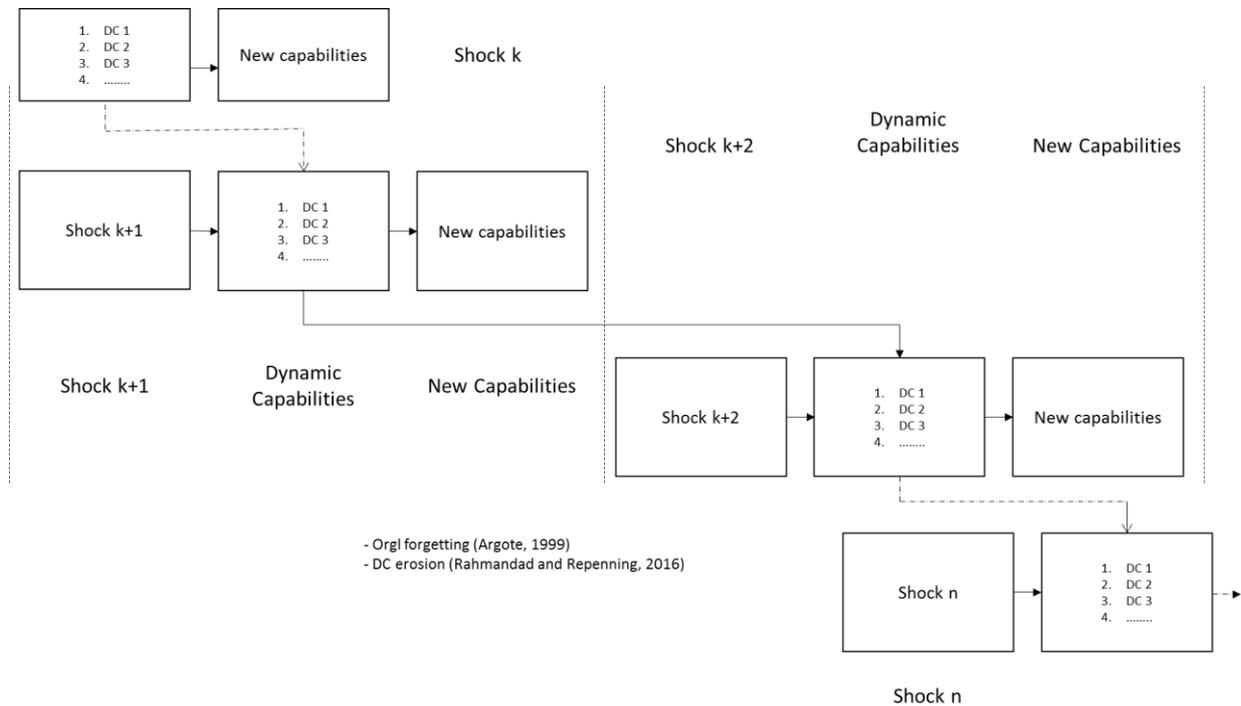
The second alternative explanation could be that telco operators simply survived without dynamic capabilities, because they managed to meticulously track their product life cycles (Danneels, 2011), or they resolved to ad hoc problem solving (Winter, 2003).

However, dynamic capabilities reflect the ability of changing and reinventing the company itself. How much of the survival is due to ad-hoc problem solving or PLC tracking in itself reflects a reinvention of a firm, and therefore the application of dynamic capabilities. Third, former monopolists might have survived thanks to a key complementary asset that they detained before liberalization: the network infrastructure. While we undoubtedly assert that owning the network represents an advantage, we claim that such benefit cannot explain the whole story. In fact, the regulator authority established fix wholesale tariffs in order to allow any other entrant to rent the existing infrastructure at a fair price, de facto almost eliminating entry barriers. Rather, we previously showed that the conditions imposed by the regulator were often too much detrimental for the incumbent. Moreover, competitors started to gradually build up their own network, hence the advantage of former monopolists were related to the short-term only, while it was progressively diluted. Finally, while the liberalization simply allowed other similar organizations to entry the market, the OTT shock is related to the advent of totally new actors which follow different business models: against them, owning the network infrastructure alone, cannot ensure survival¹.

Having considered all these aspects, we are able to propose at this stage a more complete and theoretical model of how shocks and dynamic capabilities interact each other, believing that such iteration of generation and usage of dynamic capabilities may occur in cyclical manner (Figure 2).

¹ We are thankful to an anonymous reviewer for having pointed out this issue

Figure 2. A generalized model of use, generation, and reuse of dynamic capabilities consequently to environmental shock.



Theoretical Implications

As stated at the beginning, we aimed at contributing to the existing literature in four different ways. First, we add to the dynamic capability literature by tracking and explaining the theoretical mechanism of iterative generation and use of dynamic capabilities, consequently and after external shocks of various natures. Such contribution builds on the literature streams that studied how firms learn dynamic capabilities (e.g. Bingham et al, 2015; King and Tucci, 2002; Zollo and Winter, 2002) and about organizational embedding of routines (e.g. Becker, 2004; Nonaka and Von Krogh, 2009; Zott, 2003). Second, we add to the literature related to the failure of the incumbent (Christensen and Bower, 1996; Tripsas and Gavetti, 2000; Sull, 1999), without contradicting it; in this regard, we acknowledge the added value of this paper less in the fact that we describe the survival of incumbents but in the

identification of mechanisms that allow them to do so. Third, we contribute to empirical enrich a field that too often has been criticized for being too theoretical and abstract (Helfat and Peteraf, 2009; Schilke, 2014; Stadler et al, 2013). Finally, by analyzing four different firms that experienced core shocks at the same time, showing how organizations activated processes and mechanisms for the creation and evolution of their own dynamic capabilities' stock (Schilke et al, forthcoming), we display how different strategical paths may lead to the same industry scenario. We thus identify such evolutionary path as an intriguing equifinality scenario.

Practical Implications

We claim that our research has also several practical contributions. First of all, we see how a harsher policy for monopolists can turn out being very fruitful also for themselves. Is out of scope of this paper to demonstrate that a competitive regime is superior than a monopolistic one, but widely accepted economics theory takes it for granted (Scitovsky, 2013); still, we are able to say that opening the market to competition represented a tremendous opportunity also for those players which were supposed to be only damaged. In fact, thanks to such market shock, they were able to develop dynamic capabilities and, later on, face another shock. Without liberalization telco operators would not be the same today, and we highlighted that telcos would have probably not been able to face OTTs without experiencing liberalization before: for this reason, liberalization can be categorized as a blessing in disguise.

Secondly, while we cannot provide a fully generalizable and detailed receipt for not succumbing aftershocks, we believe that our study provides some basic guidelines to managers, in order to make them able to change and adapt their companies to changing

environments. For example, we showed how some organizational activities, even if they fail in their primary aim, might be a source of knowledge that could be useful in the future. An empirical example of this phenomenon is the internationalization experience of Telecom Italia, which did not help much in terms of direct profits, but it triggered the generation of vital dynamic capabilities. Finally, our data show how often resisting to the change might not be the best solution. In fact, EU telco operators (with some previously analyzed differences for Orange) realized that a strenuous fight against over-the-tops would not have paid off in the long run, and they decided that it was better to face these new entities according to a “coopetitive” regime.

Limitations and Future Research

As any research, our study has its own limitations. Firstly, despite we put huge efforts in showing how the telecommunication industry shares many similarities with other sectors that experienced the failure of the incumbent, we must admit that each industry has its unique characteristics; hence, we cannot claim for a hundred-percent generalizability of our research. Further research could address a different industry that experienced similar shocks, in order to provide additional robustness and results’ validity. Secondly, as it happens for all qualitative investigations, our findings are affected by some extent of subjectivism exerted by researchers: our choice of inserting a large number of citations goes, however, in the direction of limiting such subjectivism, leaving to the reader to judge whether our conclusions were correct or not. Furthermore, all of us made a distinct evaluation of the collected data, and we removed all implications we did not unanimously agree upon: in this way, we promoted close adherence to data, in order to maximize the objectiveness of our theory-building process (Eisenhardt and Graebner, 2007). Thirdly, considering the huge amount of collected data, it

was very difficult to select the most explanative quotes, thus the reader might find some steps not fully empirically grounded. Such limitation was clearly due to space restrictions. We finally encourage future research aiming at analyzing the effect of dynamic capabilities generation, use, and reuse, also for non-EU telco operators, again in the spirit of a greater external validity of our takeaways.

CONCLUSION

Our work presents an opportunity to explore the generation, usage, and reuse of dynamic capabilities. The huge amount of archival material, preliminary interviews and in-depth interviews suggest strong indications that telecom operators stored dynamic capabilities developed in response to a first shock, and successively reapplied these consequently to a second shock. This theoretical mechanism could shed some light on the previously unsolved issue of why telco operators did not follow the same unfortunate path of former incumbents of the disk drive, computer, and photographic industries, despite this was very expectable according to existing premises.

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**MAKE HAY WHILE THE SUN SHINES:
AN INVESTIGATION OF ENTREPRENEURIAL AND FIRM-SPECIFIC
FEATURES THAT DRIVE INNOVATIVE START-UPS TO MARKET
SUCCESS**

ABSTRACT

Scholars for a long time attempted at unveiling the main drivers for start-ups growth, survival, and market success. This paper, adopting a capabilities perspective, aims at contributing to this literature. More specifically, through a unique dataset composed of 220 innovative, European, R&D based, born between 2005 and 2011 start-ups, this research sheds some lights on how certain characteristics of the entrepreneur and new firm are able to predict market success of the same start-up. By distinguishing science and tech based start-ups, results show empirical support for a negative stigma unleashing on serial founders of tech based start-ups, a positive effect of patents and trademarks, respectively, for tech based and science based firms, a positive effect of engineering and science-related academic background of the founder, respectively, for tech based and science based firms. Further, this study shows how technical capabilities of the firm (represented by patents) and technical competencies of the entrepreneur (represented by an engineering degree), have a complementary positive effect on tech based start-ups' market success.

INTRODUCTION

Understanding and disentangling the various drivers of performances for young innovative start-ups represent ones of the most relevant and challenging issues for scholars active in different fields of entrepreneurship (e.g. Klepper, 2001), strategy (e.g. Baum et al, 2000), and finance (e.g. Ouimet and Zarutskie, 2014). This broad research question triggers a deep interest across fields due to its particular relevance for the dynamics of an economy: in fact, innovative start-ups represent one of the main drivers for the economic growth of many countries (Acs and Szerb, 2007).

Adopting a resource-based view and capabilities perspective (Peteraf, 1993; Wernerfelt, 1984; Winter, 2012), this paper aims at contributing to the previously mentioned literature stream by analyzing which are the drivers, both at individual and firm level, that are mostly relevant for the market success of new ventures. More specifically, we want to examine whether the professional and academic background of the entrepreneur, its related capabilities, and the capabilities detained by the start-ups cover a relevant role in explaining the market performances of such new firms. In particular, we assume patents to be a proxy for technical capabilities (Lee et al, 2009) and trademarks as indicator of the ability of commercializing innovation (Sandner and Block, 2011), representing ultimately a measure of market-related capabilities of the firm. Moreover, this article explores the background of the founders, both from a professional and academic perspective, to study how such peculiarities may influence market success of owned start-ups.

Through a unique and originally developed dataset of 220 R&D based young European start-ups that issued at least one patent during the first three years of life, together with detailed information about founders' education and professional background, we aim at

shedding additional light on the factors affecting start-ups' performance. Our analysis particularly concentrates on the field of study, the academic achievements, the professional and the entrepreneurial background of the founder. In addition, we consider patents and trademarks detained by the firm after four years from its establishment. No previous research concentrated together on trademarks, patents, founder education and experience as driver for European high-tech start-ups, despite these factors have been considered singularly, as shown in the next chapter.

In order to make the research more accurate and precise, we decided to further divide our sample into tech and science based start-ups, in order to investigate whether capabilities and skills have different effects on performances depending on the nature of core commercialized products. In other words, we aim at showing how capabilities and skills are highly contingent, by varying also within a relatively small subgroup, such as the R&D based sector.

Our results show that in European R&D-focused new ventures the numerosity of trademarks is positively correlated with market success in science based start-ups, while the numerosity of patents is positively correlated with market success in tech based new venture. Secondly, our data unveils how founders who previously had other entrepreneurial experiences tend to own worse performing tech based start-ups in terms of market success; such effect, which we explain having its roots into stigma-related aspects of the hosting countries, can be attributed to socio-cultural values typical of European countries (Burchell and Hughes, 2006; Landier, 2005). Third, this paper empirically validates the hypotheses according with a scientific background leads to higher market success in science based start-ups, while an engineering background fits better tech based ones. Finally, while we predicted a positive combined effect of science-related degree of the founder / number of trademarks in

science based firms, and a positive combined effect of engineering-related degree of the founder / number of patents in tech based firms, only the second claim is validated by data. In particular, for science based one only the separate effects of science-related degree and number of trademark are positive; the interaction effect between the previous two is non-significant.

The remainder of this paper is structured as follows: the next section depicts the theoretical framework where this article might be collocated and it documents how hypotheses are generated departing from theory. Secondly, a dedicated section aims at presenting the database, how it has been structured, and which variables have been included in regressions. Thirdly, the analysis part explains the econometrics elaboration performed to provide empirical evidence to the theoretical hypotheses. Then, a section provides a discussion on the results achieved, on the limitations and suggestions for further research, and on theoretical and practical implications. Finally, a conclusive section briefly summarizes the most important takeaways of this study.

THEORETICAL BACKGROUND AND HYPOTHESES

Conceptual Framework

Scholar belonging to different fields of social sciences spent considerable efforts during last decades to study the economic and social phenomenon of start-ups (e.g. Bosma et al, 2004; Cressy, 1996; Freeman and Engel, 2007). Most of these energies, as previously anticipated, have been dedicated to shed additional light on the drivers of performance for start-ups (e.g. Baum et al, 2000; Klepper, 2001; Ouimet and Zarutskie, 2014). For example, Lee et al (2001) investigated how internal capabilities and external networks affect

performances of Korean technological start-ups; their results show that entrepreneurial orientation, technological capabilities, financial resources and external linkages to venture capital companies are all together antecedents of performances for the start-ups considered in the sample. Further, Maurer and Ebers (2006) highlight how social capital proved to be relevant for the success of new biotech ventures. Then, Cassiman et al (2008) focused on the performance effect of industry science links, concluding that citations to scientific publications are not significantly correlated with forward citations, but are positively correlated with the scope of forward citations. The idea of addressing the existence of complementarity in innovation strategy was object of study by scholars (e.g. Cassiman and Veugelers, 2006), often identifying boundary conditions in terms of geographical areas and focal industries (Veugelers and Cassiman, 1999).

Giarratana (2004) took into consideration a sample of start-ups operating in the newly emerged encryption software industry, and he asserts that innovation and product differentiation, along with investments in co-specialized assets, are variables strongly correlated to start-ups' probability to survive and grow. In order to perform this analysis, he collected data about the founder and patents related to the focal firms. The idea of considering socio-biographical characteristics of the founder to explain the success (or not) of new business ventures is not new. For example, Eesley and Roberts (2012) studied the relative importance of experience versus talent for start-ups' growth, concluding that such balance varies according to different contingencies. Previous employment for entrepreneurs has also been studied to explain new ventures' growth (Dahl and Sorenson, 2013). Further, Delmar and Shane (2006) evidence how founders' previous entrepreneurial experience is positively correlated with new venture's survival and growth; nonetheless, the authors based their study on Swedish start-ups only, limiting the generalizability of findings and exposing them to

potential country specific effects. Similarly, Gimeno et al (1997) state that serial entrepreneurs have a lower likelihood of failure when establishing new ventures; however, once again, the study was conducted by considering only US start-ups, leaving it unclear whether the same effect verifies in the European continent.

Serial entrepreneurs are composed by a consistent part of founders who experienced a failure of their previously established ventures in the past (Eggers and Song, 2015; Hyytinen and Ilmakunnas, 2007). This characteristic may have contrasting effects on start-ups' market success. In fact, on the one hand, a failure still implies a deep learning effect for the entrepreneur (Sarasvathy et al, 2013), hence corresponding to a greater amount of capabilities ready to be used in successive attempts; on the other hand, failed entrepreneurs also suffer from negative stigmatization due to his/her alleged inability to run a business. This second effect clearly has a negative impact on future performances of the founder, due to negative reputation and more difficulties in collecting financial resources (Shepherd and Haynie, 2011). Several studies evidenced how the magnitude on the previously mentioned effect varies according to different geographical areas of the world: in particular, the US culture seems to be more indulgent with failed entrepreneurs, and public opinion tends to exalt the pedagogical implications of the experience; in Europe, instead, the same entrepreneurs are, on average, more negatively stigmatized (Landier, 2005; Vaillant and Lafuente, 2007). Therefore, these existing divergences between Europe and the United States are likely to produce different results when serial entrepreneurs are taken into account to address new ventures' performances.

Moreover, the IPRs stock detained by a company might be considered as another interesting source of information (Arora and Merges, 2004). While the literature that addresses innovation and R&D intensive firms has largely regarded patents as important tools

to be analyzed and studied (e.g. Cohen et al, 2002; Ernst, 2001; Hall, 2007; Lanjouw and Schankerman, 2004), quite fewer studies in the past considered trademarks as a complementary or alternative tool (Mendonça et al, 2004). In more recent years, however, several papers are both exploiting and discussing the potential benefit of collecting trademarks-related data (e.g. Helmers and Rogers, 2010; Mendonça et al, 2004; Schmoch, 2003). As mentioned, scholars employed patents for different purposes, which vary from addressing the technological and economic importance of a specific innovation (Almeida, 1996) to inventive activity more in general (De Rassenfosse et al, 2013). Regarding trademarks, as previously stated, its use in economic research is much more limited; some exceptions are represented by Schmoch (2003), who claims that trademark are very good proxies for innovation and Malmberg (2005), who mentions the possibility of relating trademarks to new product introduction.

In this paper, coherently with our main purpose of investigating the role of capabilities, both at the entrepreneurial and company level, in affecting new ventures' market success, we follow the literature that considers patents as proxy for technical capabilities of the company (Lee et al, 2009) and trademarks as an indicator of the ability to market innovation (Sandner and Block, 2011), representing ultimately a measure of market-related capabilities of the considered start-up.

Furthermore, the literature acknowledges an important distinction for firms from a product standpoint: discrete industry products and complex industry products (Cohen et al, 2000). Such differentiation looks at the nature of the core products commercialized by a specific group of firms. According to this classification, products are considered complex if they are the results of an assembly of many physical components, such as computers, mobile phones, printers; usually complex products can be reverse-engineered. On the other hand, a

product is categorized as discrete if it is not composed by separate elements; examples of discrete products are drugs, chemical compounds, gases. In this latter case, the reverse engineering process is much more difficult since many products are the result of irreversible chemical reactions. Applied to our study, this distinction is expected to have important implications on how specific capabilities of the firm, entrepreneurial skills and backgrounds affect market success, depending whether a start-up is producing complex or discrete products.

For the sake of this research, we will refer to science and tech based start-ups; below we show how the first group is manufacturing discrete products while the second one concentrates on complex products. Cohen et al (2000) performed a detailed analysis on the reason why some firms patent more and other less. They say that complex product industries are more likely to use patents to force rival into negotiations, while in discrete product industries companies aim primarily at blocking the development of substitutes by rivals. We can link these finding, at least partially, to our database. In fact, in our sample, discrete product industries are represented by biotech and natural science R&D based start-ups, which are also science base ventures. Complex product industries, instead, are engineering R&D (tech based) firms (Meyer-Krahmer and Schmoch, 1998). Such differentiation can contribute to predict the value of different firm and entrepreneurial specific capabilities, which will be theoretically addressed in detail at the hypotheses development stage. In fact, the literature on capabilities and product development acknowledges the possibility that, depending on the core products manufactured by a given firms, different capabilities can generate different effects on performances (e.g. Schilling, 2000; Verona, 1999).

Hypotheses

Founders History: Serial Founders and Previous Failure

“If you start a company in London or Paris and go bust, you have just ruined your future; do it in Silicon Valley and you have simply completed your entrepreneurial training.”
The Economist, 1997.

Such quote, despite reflecting a journalistic and shock-seeking style, depicts in a quite accurate manner the phenomenon. In fact, as previously stated in the conceptual framework part, essentially having experienced a failure during the entrepreneurial life generates two contrasting effects on future likelihood of success. On one hand, in fact, serial founders acquire entrepreneurial experience and entrepreneurial-specific practical knowledge (Corolleur et al, 2004): by engaging in multiple start-ups’ creations, entrepreneurs learn how to practically identify a proper business model, collect financial resources, and selecting the right management board (Eesley and Roberts, 2012). Other documented benefits of being a serial founder include a greater ability of identifying viable opportunities (Baron and Ensley, 2006), and of better accomplishing key strategic activities such as new product development and international expansion (Bingham and Eisenhardt, 2011; Gilovich et al, 2002).

On the other hand, in the case of serial founders which have been unsuccessful in their ventures, some cultures tend to negatively stigmatize failed entrepreneurs (Landier, 2005), and hence their capacity to collect new financial endowments in the future may be harmed (Hsu, 2007). This issue often goes hand in hand with local law that regulates the bankruptcy: for example, the large majority of European countries legally forbid an entrepreneur that went bankrupt to establish a new venture within a given time period; the US legislation, instead, is much softer on this point (Landier, 2005). White (1996) also explains in a very detailed way how the cost of bankruptcy is much higher for European entrepreneurs if compared to the one

sustained by US peers. As said, public opinion and venture capitalists' propensity of financing new venture goes in parallel with the legal setting of the two continents, resulting to a much greater tolerance for failure in US, especially some areas like Silicon Valley, compared to Europe (Saxenian, 1996). Literature acknowledges that failures might be good also from a social welfare point of view, due to positive externalities generated (Knott and Posen, 2005).

Since our research is focused on European start-ups, and remarking that a consistent percentage of serial founders experienced failures in the past, we expect that the negative stigma has an effect on future start-ups' (founded by the same entrepreneur) market success. However, whether such negative effect overcomes the positive learning-by-doing one, we believe it depends if firms are science or tech based. In fact, science based start-ups often require more consistent and idiosyncratic investments (Gwynne and Page, 1999), while tech based ones, which are mostly represented by software and other engineering corporations are expected to be, on average, more flexible and less capital intensive. According to this theoretical speculation, founders of science based firms might be less tempted to try without having solid perspectives compared to their colleagues who start tech based new ventures.

This should imply the negative stigma attached to failures to be more significant in tech based sectors. Thus, we predict such negative stigma and adverse institutional setting to overcome positive effects generated by experience, and hence preventing serial founders to collect adequate financial resources for new tech base ventures. This effect should ultimately lead to lower market success. Contrariwise, we expect that the two contrasting effects, negative stigma and positive experience, cancel out each other for science based start-ups, de facto having no implications on market success. In a more formal way:

- *H1a: Being a serial founder in Europe, ceteris paribus, reduces the performances of newly established science based start-ups.*
- *H1b: Being a serial founder in Europe, ceteris paribus, reduces the performances of newly established tech based start-ups.*

Founders' and Firms' Capabilities:

According to the resource based view of the firm, capabilities constitute important precursors for achieving performances and a sustainable competitive advantage (Barney, 1991). By adopting this perspective and to enrich the knowledge about which elements do substantially contribute to start-ups' performance, we investigate the role of entrepreneurial-specific and firm specific capabilities.

Coherently with a capabilities and assets complementarity perspective (Helfat, 1997), we claim that per each subgroup of our sample, different capabilities are likely to have a positive impact on market success. In fact, our study wants to focus on how different types of products manufactured require also different capabilities for market success. By analyzing an already narrow sector (R&D based firms), we aim at highlighting how products related differences apply even if a relatively small and selected portion of organizations are taken into account. Hence, recognizing the existence of a product specific discriminant criterion in terms of best-fitting capabilities, we proceed with hypotheses formation bearing in mind that different products may lead to also different effects of capabilities.

More specifically, for science based ventures we expect a positive effect on performances of scientific capabilities detained by the founder, while we expect engineering-related capabilities to positively affect performances in start-ups that are tech based.

Essentially, such claim has its roots into the idea that a science based new venture mostly

likely benefits more from the skills of a pure scientists, while engineering based firms are expected to show superior performances when the entrepreneur has engineering-related capabilities. In other words, we expect that science based start-ups, on average, perform better if the founder detains a scientific degree, while for tech based firms such positive effect should be driven by an engineering-related degree of the entrepreneur. In a more formal way:

- *H2a: For science based start-ups, founders detaining science-related degrees are positively correlated with start-ups' performances, ceteris paribus.*
- *H2b: For tech based start-ups, founders detaining engineering-related degrees are positively correlated with start-ups' performances, ceteris paribus.*

Regarding firm capabilities, our intention is, again, to investigate of the different effect that these have on firms, depending on the core products' nature. Thus, we predict a positive linear effect of additional patents (which represent technical firms' capabilities) detained by tech based companies, while the same effect is supposed to vanish if only science based new ventures are taken into account. We propose this for two main reasons: first, science based firms typically do not need many patents; in fact, due to the discrete nature of their core products, few patents should be able to protect their intellectual property (Reitzig and Wagner, 2010). Additional patents are not expected to have significant effect on performances. On the contrary, in complex product industries, a final product is the result of many components, each one might need a different patent to protect the final outcome as a whole (Hall, 2004). Hence, the same amount of technical capabilities is represented by more patents (reflecting the number of components of the final product), in respect to science based firms. Second, returning to the conjecture of Cohen et al (2000), we expect that the willingness to force rivals into negotiations assume a lower relevance compared to blocking

the development of substitute products. Hence, such theoretical reasoning leads to the following set of hypotheses:

- *H3a: In science based start-ups, additional patents have a negligible effect on performances, ceteris paribus.*
- *H3b: In tech based start-ups, additional patents have a positive effect on performances, ceteris paribus.*

The ability of commercializing innovation is expected to be an important complementary asset to pure technical knowledge, in order to ensure a competitive advantage. In other words, we predict a complementarity of marketing capabilities (represented by trademarks) in respect to technical capabilities (represented by patents): Song et al (2005) show how such complementarity is particularly relevant in highly turbulent environments. However, it should be reasonable to expect such complementarity being stronger for the subsample less affected, in terms of market performances, by a greater number of patents, i.e. for science based firms. In particular, for tech based new ventures, it is likely that the complementary effect between trademarks and patents is tarnished by patents numerosity.

In other words, we expect that the effect of trademarks on market success for tech based firms has less relevance and the same effect is mostly likely to be outclassed by the much stronger one of patents. Further, it is rational to believe that more technical capabilities in tech based firms can have a greater impact on the market success of the focal firms, compared to market capabilities. Hence:

- *H4a: In science based start-ups, the number of trademarks owned has a positive effect on performances, ceteris paribus.*

- *H4b: In tech based start-ups, the number of trademarks has a negligible effect on performances, ceteris paribus.*

Finally, we want to shed additional light on the interaction between entrepreneur and firm-specific capabilities. In other words, our intention is to unveil any potential complementarity that exists between the type of degree got by the founder and the number of patents / trademarks detained by the firms. More specifically, we claim that in tech based new ventures, where both additional patents and an engineering background of the founders are expected to generate a positive effect on performances, also the interaction effect between the former and the latter should be positive. Basically, we argue that proper or “best-fitting” capabilities are mostly like generate superior returns because they reinforce each other, and thanks to a complementarity mechanism the overall effect of detaining these capabilities together is supposed to be more robust than the sum of the single effects. Further, we previously hypothesized that for science based start-ups a scientific background of the entrepreneur is positively associated with performances of the firm. This effect is expected to be negligible for additional patents, while positive and significant for more trademarks.

Hence, we expect also a complementary positive effect for the interaction between number of trademarks and scientific background of the entrepreneur, for the sole science based firms: in this way, for such category we predict a complementarity effect on performances for marketing capabilities of the firm and scientific capabilities of the founder. This theoretical reasoning leads to the following last set of hypotheses:

- *H5a: There is a complementary effect in science based start-ups performance of trademarks' numerosity and a scientific background of the entrepreneur.*

- *H5b: There is a complementary effect in tech based start-ups performance of patents' numerosity and an engineering background of the entrepreneur*

DATA

Data Sources and Sample

To conceive and construct our unique database, we use a multitude of different sources that require many different efforts. We primarily extracted all European firms that started their operation from 2005 to 2011 from Orbis¹, a comprehensive private database that contains information on over 200 million companies worldwide. The choice of the previously indicated time window reflects a mere reason of data availability. Since our focus is on R&D based firms, we kept only those start-ups that are categorized as 2-digits NACE code 72: “Scientific research and development”. Nace classification stands for Nomenclature statistique des activités économiques dans la Communauté européenne (in English: Statistical classification of economic activities in the European Community), and it is the official classification of industry belonging used in the European Union. For further investigation on how the Nace classification system works see Schnabl and Zenker (2013). The next step was to match our entries with the ICRIOS-Patstat database (Coffano and Tarasconi, 2014) in order to flag all the new ventures that released at least one patent in the neighborhood of -3/+3years from incorporation date. Such criterion roots into our core intention to concentrate on innovative infant firms only, and study complementarity aspects with other capabilities.

We, then, analyzed one-by-one all the firms included in the database in order to remove all the entries that represent not real start-ups, e.g. the opening of a new division of a

¹ <https://www.bvdinfo.com/en-us/our-products/company-information/international-products/orbis>

giant multinational enterprise. In fact, such new ventures, despite sharing many similarities with ordinary start-ups, detain a huge advantage of detaining a conspicuous financial endowment at the establishment date (Barkema and Vermeulen, 1998); since we focus on financial performances of the firms, including such category would clearly bias the results. At the end of these manipulations, we got a sample composed by 220 firms. We then investigated whether the inventor of the first patent of each start-up (from here we will refer, for simplicity, to the entry patent of a start-up) is a serial one: in order to do this, we matched the inventor code again with the ICRIOS Patstat database to check if previous patents have been issued by the same person. Such procedure based on the inventor code and not on his/her registry information has the great advantage of solving the known problem of homonymy (Czarnitzki et al, 2009). In a similar vein, we verified whether the same inventor patented in the next three years after the filing of the entry patent. Subsequently, we semi-manually retrieved information about patents and trademarks from Patstat² and Global Brand Database³, respectively.

Successively, we started to collect information about the founder. This task required to manually collect information firstly about anagraphic details of the founder, and once completed we started to record information on academic background of each single founder. For the few cases of multiple founders, we decided to collect the related information about the founder who also covered right after foundation the CEO role; the idea of using a discriminant feature to select only one founder to be further analyzed is not new in the literature (e.g. Arora and Nandkumar, 2011). For what concerns data collection on individual features of the selected founder, we adopted a diversified research method, which comprehends many steps. Primarily, we tried to recover information about the entrepreneur

² <https://data.epo.org/expert-services/index-2-3-5.html>

³ <http://www.wipo.int/branddb/en/>

through the company website; such investigation allowed collecting data on only a small percentage of founders (roughly 15%). The second attempt consisted in looking for information on LinkedIn; such step allowed us to store personal information of an additional 40% of the focal founders. Thirdly, we insisted on retrieving information through a myriad of different sources, which include Facebook, direct e-mail contact, phone calls, CV posted on universities' websites (in case of academic spin-offs), governmental websites, personal connections, private local databases. Collecting information about the founder proved to be particularly complicated due to language barriers encountered: some private database or CVs were written in Swedish, Finnish, Estonian, Bulgarian, and so on. After a time and energy-consuming data mining process, we were able to reconstruct all the desired information about the entrepreneur for 197 start-ups, which represent more than 89.54% of the original observations.

We did not observe any systematic distortion of the dropped observation in terms of establishment year, revenues, nationality, survival; hence we concluded that the 10.46% of missing observation are randomly distributed and do not bias our results. A final operation was represented by checking one-by-one the observation present in this semifinal version of our database, in order to be sure that all the start-ups were truly new ventures and not new established divisions of giant multinational enterprises. At this point, we had to classify and divide the sample between science and tech based start-ups. In order to accomplish this task, we looked at the core business of each firm. Unfortunately, the further distinction adopted by the official Nace classification, is not fully supportive for the sake of this research. In fact, Nace 72 is additionally divided into "Research and experimental development on biotechnology" (72.1.1), "Other research and experimental development on natural sciences and engineering" (72.1.9), and "Research and experimental development on social sciences

and humanities” (72.2.0). We indeed proceeded in the following way: all Nace 72.1.1 start-ups (biotech R&D based) were automatically classified as science based, while for Nace 72.1.9 we had to manually check whether each start-up was science (natural science R&D based) or tech based (engineering R&D based). No start-ups classified as Nace 72.2.0 were present in our sample. Result of this further sample division includes 90 science based and 107 tech based firms.

Variables

Dependent Variable

As measure of performances achieved by the new ventures, we adopt the absolute value of revenues at the time $t+3$ years from incorporation date of each firm: “end_rev”, expressed in thousands of euros. Such decision has many advantages and using absolute values to assess performances or growth is widely accepted by the literature (e.g. Colombo and Grilli, 2005; Eisenhardt and Schoonhoven, 1990; Storey, 1994). In fact, it represents an accurate measure of firms’ performances due to the fact that all start-ups begin their operation with a zero-point revenues, hence no subtractions or additional manipulations are needed (Coad, 2009).

Independent Variables

In order to test the previously state hypotheses, we had to structure several dependent variables in our model. As proxies for technical and marketing capabilities, we created two ordinal variables that measure respectively the amount of patents and trademarks accumulated by each firm in three years after the establishment date. Variables “nr_pat” and “nr_tm” count only patents and trademarks issued by the official European agencies. Switching to founder’s curricula, we inserted a dummy variable “serialf” which assumes value 1 if the entrepreneur

started other ventures before the focal one, and 0 otherwise. Then, to catch the academic background of the founder, we created ten dummies: “b_sc”, “b_eng”, “b_bus”, “b_med”, “b_hum”, “m_sc”, “m_eng”, “m_bus”, “m_med”, “m_hum”, which respectively assume value 1 if the entrepreneur has a science-related bachelor, an engineering-related bachelor, a business-related bachelor, a medicine-related bachelor, a humanities-related bachelor, a science-related master, an engineering-related master, a business-related master, a medicine-related master, a humanities-related master; such dichotomous variable assume 0 otherwise. For an exhaustive and complete list of which degrees are included in the five different categories, see Table 1 in the appendix. For the sake on parsimony in terms of included variables, taking also into consideration our sample size, we created five more dummies which are equal to one if the entrepreneur has a science-related degree (deg_sc), an engineering-related degree (deg_eng), a business-related degree (deg_bus), a medicine-related degree (deg_med), a humanities-related degree (deg_hum). Intuitively, to a given founder might be attributed two positive dummies of the previous list if he/she has a bachelor and a master related to different disciplines. Subsequently, we generated the interaction terms between founders’ and firms’ capabilities. In particular, we created the variables “deg_eng_pat” = “deg_eng” * “nr_pat” and “deg_sc_tm” = “deg_sc” * “nr_tm”, which reflect the two interactions under investigation.

Controls

In order to reduce any potential systematic bias, we inserted many controls in our regressions. First, we created a series of dummy variables, which assume 1 or 0 depending on the foundation year: “birth2005”, “birth2006”, “birth2007”, “birth2008”, “birth2009”, “birth2010”, “birth2011”, “birth2012”. Controlling for the starting date has the huge advantage of depurating regressors from the fixed effect given by macroeconomic

conjunctions, exceptional events, political disruptions, and so on (Greenwood et al, 2007) . In our case, this procedure assumes even more relevance since the global financial crisis exploded in the middle of the considered years. Then, we inserted two dummy variables which assume value 1 (and 0 otherwise) if the entry patent inventor issued other patents before (`backward_inv`) and in the next three years from the focal one (`forward_inv`). Moreover, we created a dichotomous variable “PhD” which captures whether the considered founder achieved a PhD or not. Another dummy variable “before_employee” is equal to 1 if the entrepreneur has worked any company as employee before starting the new venture; the variable assumes value zero otherwise. Finally, we inserted two additional dichotomous variables. “Found_info” flags all the observations for which data about the entrepreneur are available; obviously, all analyses where founders’ features are involved are conducted considering only such subsample. “Science_b”, instead, assumes value equal to 1 if the firm is a science based one, and 0 otherwise.

ANALYSIS

Descriptive Findings

Table 1 and 2 show descriptive statistics for the considered variable, respectively for the total sample and the one restricted to the subgroup for which we have complete data on the founder. The distribution of observations does not change significantly whether we consider the whole sample or the subgroup that includes only complete data. This is of crucial importance for subsequent analyses, since we can be reassured about the fact that missing data are randomly distributed, hence results generated from the subsample are not biased. Table 1 does not report variables related to the entrepreneur, since not all observations are complete in this respect. In this paper, we comment the descriptive statistics regarding the

sole subset containing complete information about the founder. This will be the dataset that is going to be used to test our hypotheses. “end_rev”, the dependent variable ranges from 0 to 62,228, which means that innovative start-ups included in our dataset obtained revenues 3 years from establishment date that vary between € 0 and € 62,288,000, with an average value of € 1,101,000. Quite interestingly, more than 44% of the considered entrepreneurs got a PhD before starting the focal new venture.

Moreover, almost 21% of them established other start-ups in the past, and approximately 80% worked as an employee in previous years. Regarding information about the entry patent issuer, roughly 49% of them patented before and 65% did it in the next three years, after the priority date of the focal patent. In the period from 2005 to 2009 there was an almost homogeneous new start-ups yearly entry rate, while less new ventures entered the market in the two subsequent years. The number of patents that considered start-ups have in portfolio range from 1 (by construction) to 59. The average number of patents is equal to 2,39, implying that few companies managed to create a very considerable patent portfolio in three years. While one may think that outliers can disturb or even bias the analysis, we decided not to remove them, because outliers in our sample represents the best performing firms, de facto making it more economically interesting to include them in the study. The distribution of total trademarks owned by the firms, instead, shows a more linear trend, with a range that varies from 0 to 5. Going back to founders' feature, Table 1 shows that approximately 26% of the founders have a degree in engineering-related subjects, 23% in business, 40% in science, 21% in medicine, and only 3.5% in humanities. Such distribution is reasonable, considering that our focus is on innovative R&D based start-ups. It must be noted that the sum of the percentages exceeds 100% because several founders have multiple degrees

in different fields. Finally, slightly less than the half of the considered start-ups is science based ones, according to the previously explained classification.

Table 1. Descriptive statistics for the total sample.

Total Sample					
	count	mean	sd	min	max
end_rev	220	1018.005	5078.486	0	62288
backward_inv	220	.4636364	.4998132	0	1
forward_inv	220	.6136364	.488026	0	1
birth2005	220	.2136364	.4108077	0	1
birth2006	220	.2227273	.4170256	0	1
birth2007	220	.1772727	.3827703	0	1
birth2008	220	.1681818	.3748806	0	1
birth2009	220	.1409091	.3487212	0	1
birth2010	220	.0636364	.2446607	0	1
birth2011	220	.0136364	.1162404	0	1
nr_pat	220	2.3	5.143689	1	59
nm_tm	220	.3181818	.8855184	0	5

Table 2. Descriptive statistics for firms with complete information on founders

Firms with Complete Information of Founders					
	count	mean	sd	min	max
end_rev	197	1101.046	5359.73	0	62288
PHD	197	.4416244	.4978458	0	1
serialf	197	.2081218	.4069988	0	1
before_employee	197	.8020305	.3994843	0	1
backward_inv	197	.4873096	.5011124	0	1
forward_inv	197	.6497462	.4782648	0	1
birth2005	197	.2081218	.4069988	0	1
birth2006	197	.2233503	.4175523	0	1
birth2007	197	.1827411	.3874387	0	1
birth2008	197	.1573604	.365068	0	1
birth2009	197	.1522843	.3602116	0	1
birth2010	197	.0609137	.2397813	0	1
birth2011	197	.0152284	.1227723	0	1
nr_pat	197	2.390863	5.420531	1	59
nm_tm	197	.3248731	.8841233	0	5
deg_eng	197	.2588832	.4391373	0	1
deg_bus	197	.2284264	.4208883	0	1
deg_eng_pat	197	.8984772	5.139865	0	59
deg_sc	197	.4010152	.4913528	0	1
deg_sc_tm	197	.1015228	.4947146	0	5
deg_med	197	.2182741	.4141269	0	1
deg_hum	197	.035533	.1855943	0	1
science_b	197	.4568528	.499404	0	1

Considering the correlation matrixes of most relevant variables, no significant difference exists whether the whole sample or its complete subpart are take into account. For the sake of brevity and information readability, we included in Table 3 and 4 only dependent and independent variables, plus all the dummies regarding study fields of the entrepreneurs. Results reported in correlation matrixes are encouraging and go in the direction of our hypotheses. In particular, both trademarks and patents numerosity are positively correlated with final revenues, and the serial founder dummy variable presents a negative correlation with the considered dependent variable.

Table 3. Correlation matrix for the total sample.

Total Sample												
	end_rev	serialf	nr_pat	nm_tm	deg_eng	deg_bus	deg_eng_pat	deg_sc	deg_sc_tm	deg_med	deg_hum	science_b
end_rev	1											
serialf	-0.0547	1										
nr_pat	0.604***	0.129	1									
nm_tm	0.170*	0.0522	0.0712	1								
deg_eng	0.117	0.00335	0.120	0.0979	1							
deg_bus	-0.0484	0.156*	0.0636	0.131	-0.0806	1						
deg_eng_pat	0.656***	0.0563	0.898***	0.0558	0.299***	0.0307	1					
deg_sc	-0.00330	-0.0176	-0.0474	-0.0551	-0.333***	-0.222***	-0.110	1				
deg_sc_tm	-0.0252	-0.0431	0.0151	0.480***	-0.109	0.0673	-0.0327	0.260***	1			
deg_med	-0.0729	-0.0298	-0.0578	-0.0867	-0.278***	-0.112	-0.0830	-0.249***	-0.0468	1		
deg_hum	-0.0175	0.113	0.0802	-0.00666	-0.0416	0.0342	-0.0199	-0.0817	-0.0352	-0.0894	1	
science_b	0.00208	-0.0297	-0.0203	0.0188	-0.248***	-0.101	-0.104	0.187**	0.0409	0.0887	0.0459	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4. Correlation matrix for firms with complete information on founders.

Firms with Complete Information on Founders												
	end_rev	serialf	nr_pat	nm_tm	deg_eng	deg_bus	deg_eng_pat	deg_sc	deg_sc_tm	deg_med	deg_hum	science_b
end_rev	1											
serialf	-0.0635	1										
nr_pat	0.605***	0.123	1									
nm_tm	0.178*	0.0522	0.0734	1								
deg_eng	0.116	-0.0175	0.118	0.111	1							
deg_bus	-0.0562	0.138	0.0568	0.142*	-0.128	1						
deg_eng_pat	0.655***	0.0492	0.900***	0.0589	0.297***	0.0202	1					
deg_sc	-0.0161	-0.0623	-0.0630	-0.0665	-0.389***	-0.273***	-0.127	1				
deg_sc_tm	-0.0285	-0.0548	0.0118	0.507***	-0.122	0.0596	-0.0361	0.251***	1			
deg_med	-0.0823	-0.0590	-0.0677	-0.0971	-0.312***	-0.141*	-0.0926	-0.307***	-0.0589	1		
deg_hum	-0.0205	0.104	0.0774	-0.00852	-0.0508	0.0262	-0.0229	-0.101	-0.0395	-0.101	1	
science_b	0.000343	-0.0434	-0.0267	0.0435	-0.263***	-0.111	-0.111	0.185**	0.0385	0.0828	0.0441	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Key Findings

In order to test the previously stated set of hypotheses, we ran four distinct OLS regressions, all reported in Table 5. In details, , regression 1 is dedicated to verify H2a and H5a, regression 2 provides empirical support to H2b and H5b, while regressions 3 is regarded to assess H1a, H3a, H4a; regression 4, finally, addresses H1b, H3b, H4b.

Starting from our first hypothesis, according to which serial founders are less likely to have market success new establishing new tech based ventures, we find empirical support from data. In particular, our model esteems an average decrease in revenues of € 1,806,000 if the innovative start-up is founded by a serial entrepreneur. As predicted by our theoretical mechanism, such effect vanishes away when science based start-ups are considered. We postpone a more exhaustive debate on this issue to the discussion section. Science related degrees are also positive correlated with market success of science based venture (H2a), and more specifically for this subset an entrepreneur with a scientific academic background corresponds to an average increase of € 2,053,000 in revenues three years after the establishment. H2b results also verified, but only if the focal firm detains more than two patents: in fact, the combined effect of both the engineering background dummy and the interaction between engineering background and number of patents, becomes positive and significant starting from 3 patents that the start-up has in portfolio. Regressions' results seem also in line with H3a and H3b, in fact from the table it can be observed a strong correlation between number of patents in portfolio and revenues only for tech based firms. In particular, each additional patent owned by a specific tech based start-up corresponds, on average, to € 726,000 more in revenues three years after incorporation. The same is true also for H4a and H4b, resulting an average increase in revenues for science based firms of € 1,200,000 per each trademark stored in portfolio. Finally, regarding the last set of hypotheses, H5a and H5b,

we found empirical support for the first one only. In fact, while the interaction coefficient between number of patents and engineering-related background in tech based start-ups is significant and positive, data shows no significant correlations between revenues and the interaction coefficient between number of trademarks and science-related background of the founder in science based start-ups. This poses new intriguing and challenging questions that this paper tries to address in the next session. Figure 1 and 2 graphically represent the achieved results in respects to the previously stated hypotheses.

Table 5. OLS regressions for four distinct models.

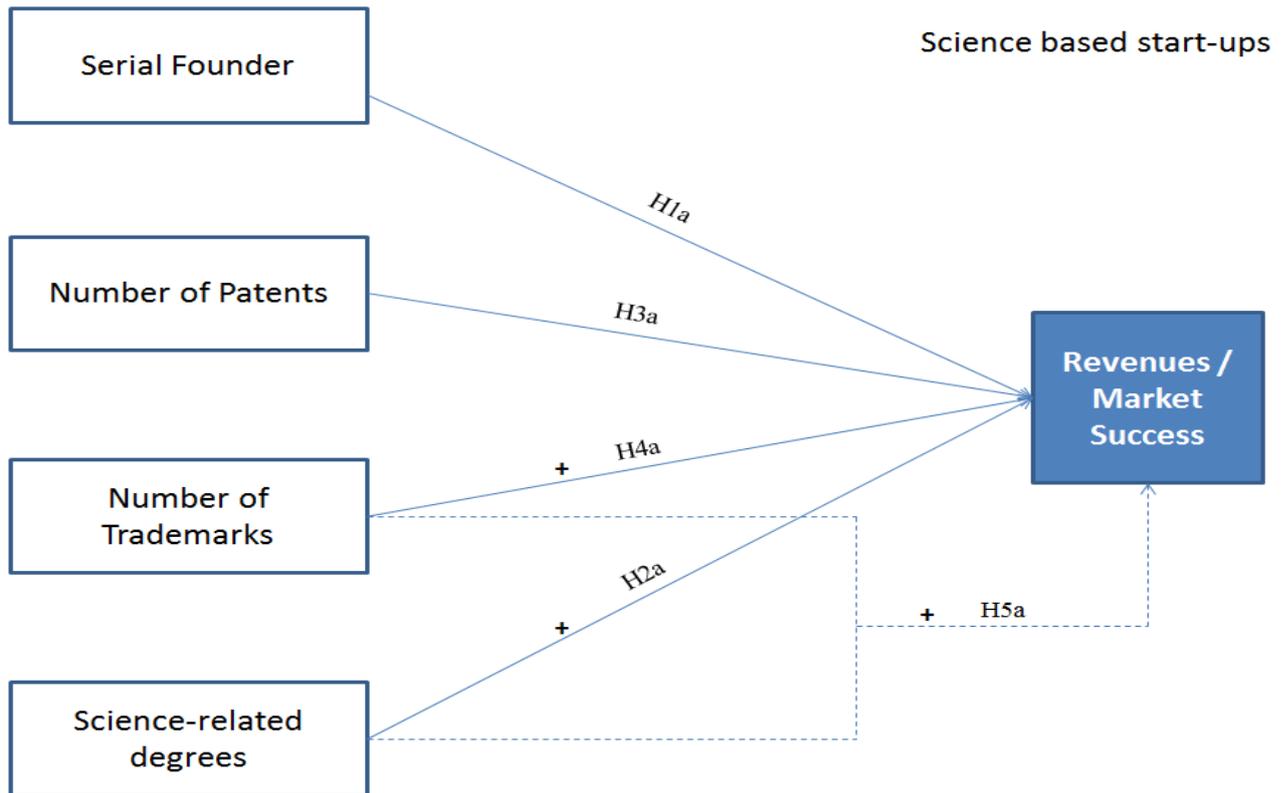
VARIABLES	(1) Science b end_rev	(2) Tech b end_rev	(3) Science b end_rev	(4) Tech b end_rev
deg_sc	2,053** (987.7)			
deg_sc_tm	-1,466 (926.1)			
serialf	-430.6 (1,210)	-1,690* (902.3)	-652.6 (1,206)	-1,806** (908.4)
PHD	-1,464 (1,049)	-1,151 (900.6)	-873.3 (925.3)	-1,463 (900.0)
before_employee	1,056 (1,011)	-237.8 (1,081)	1,101 (1,020)	-631.3 (1,081)
backward_inv	-284.8 (1,174)	265.3 (1,119)	-468.6 (1,177)	224.9 (1,133)
forward_inv	-56.74 (1,262)	-382.8 (1,154)	-273.4 (1,290)	-636.5 (1,152)
nr_pat	24.54 (142.5)	-14.78 (354.5)	37.18 (145.9)	726.0*** (54.91)
nm_tm	1,669*** (488.3)	438.5 (522.9)	1,200*** (414.5)	162.2 (514.5)
birth2006	-6.031 (1,428)	584.9 (1,100)	-648.1 (1,380)	235.3 (1,098)
birth2007	-203.2 (1,343)	-1,559 (1,318)	-672.0 (1,312)	-1,382 (1,331)
birth2008	1,163 (1,472)	212.6 (1,190)	1,017 (1,510)	-243.8 (1,188)
birth2009	-275.8 (1,507)	-178.4 (1,202)	-1,035 (1,515)	-415.7 (1,213)
birth2010	8,011*** (1,920)	370.1 (1,848)	7,659*** (1,843)	222.4 (1,872)
birth2011	41.18 (3,965)	4,333 (2,717)	-934.9 (4,051)	3,957 (2,751)
deg_eng		-1,636* (983.2)		
deg_eng_pat		756.1** (354.7)		

Constant	-780.5 (1,536)	1,601 (1,398)	538.3 (1,405)	1,122 (1,369)
Observations	90	107	90	107
R-squared	0.390	0.692	0.339	0.676

Standard errors in parentheses

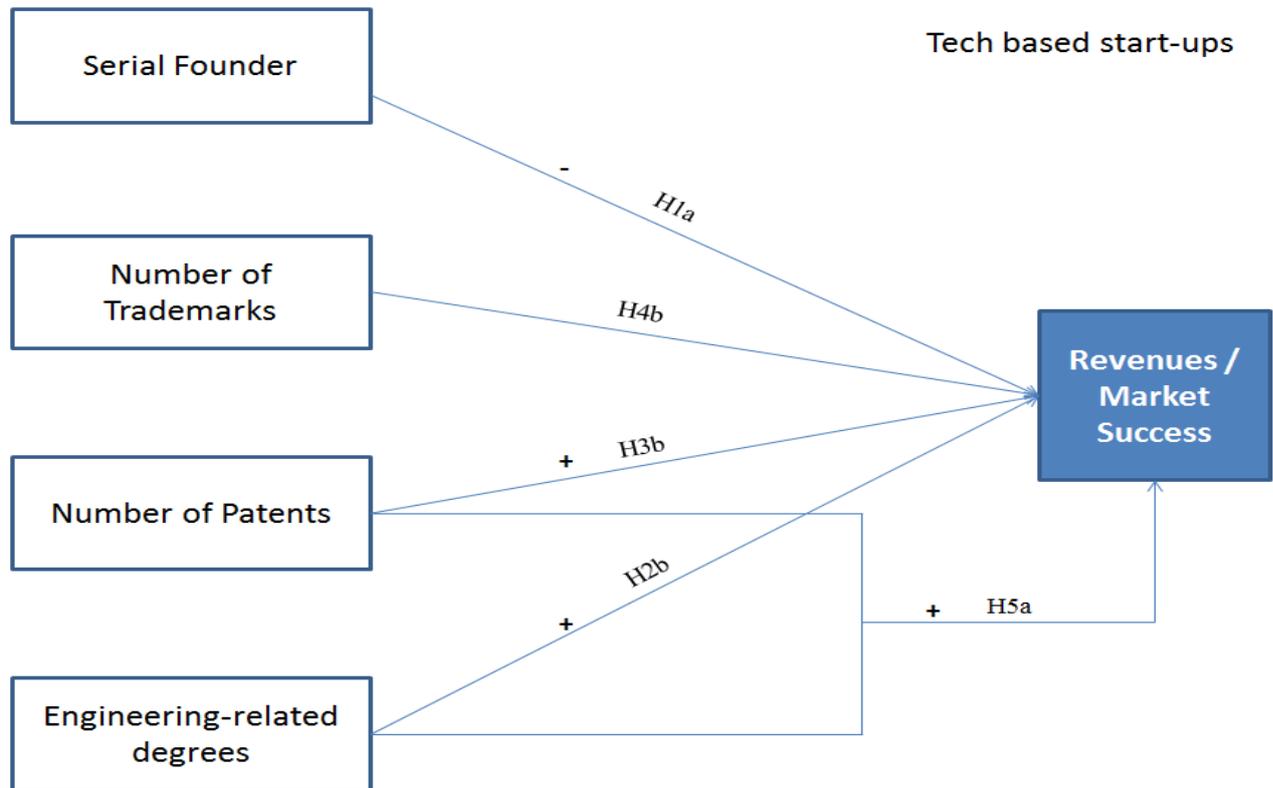
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Results for science based start-ups.



Note: continuous lines indicate hypotheses verified by data, dashed lines indicate absence or weak empirical support

Figure 2. Results for non- science based start-ups.



Note: continuous lines indicate hypotheses verified by data, dashed lines indicate absence or weak empirical support.

DISCUSSION

Previous research has investigated which are the drivers for start-ups growth, survival and market success (e.g. Davila et al, 2003; Hyytinen et al, 2015; Sommer et al, 2009). This paper contributes to the literature by adding a capabilities perspective, both at the firm and at the entrepreneurial level, which helps understanding the market success drivers for innovative new ventures. Our focus is on European, innovative start-ups (i.e. those firms which issue at least one patent in the period adjacent their establishment date), operating in the Nace72 industry (R&D based firms). Therefore, the generalizability of results to other sectors and geographical area is clearly limited; however, this article sheds light on an economically

significant sector of start-ups, which is constantly growing in terms of relevance for the real economy (Nanda and Rhodes-Kropf, 2013).

The empirical analysis, to a large extent, confirms the previously stated hypotheses, with only one exception. First, results suggest that the negative stigma of being serial entrepreneurs affect primarily tech based start-ups, while for science based ones the effect is non-significant. This evidence may have different explanations: one option is that science based start-ups, which are typically biotech firms, often require more consistent and idiosyncratic investments, while tech based ones, which are mostly represented by software and other engineering corporations are, on average, more flexible and less capital intensive. Thus, founders of science based firms might be less tempted to set up a new business without having solid perspectives compared to their colleagues who start tech based new ventures. This should, at least partially, explain the fact that the negative stigma attached to failures in tech based sector is more significant. Such explanation is in line to what we hypothesized a priori.

Data also shows that for the science based subsample 17.35% of the entrepreneurs are serial founders, while for the tech based subgroup 24.46% of founders are serial; such difference of distribution seems to support the previous theoretical explanation, evidencing a higher trial ratio for tech based start-ups. However, since theory says that having experienced failure has two contrasting effects, one negative (stigma) and one positive (experience), another explanation might be that the negative stigma remains the same, while experience for science based ventures is more important. In fact, knowledge in science based, and biotech sector in particular, is very complex and multidimensional (Arora and Gambardella, 1990), a peculiarity that suggests how relevant previous experience might be. Results we got, unfortunately, do not allow a disentangling between the two contrasting components, but

show only the combined effect. It is important remark here that when we address the complexity of knowledge in a sector (Arora and Gambardella, 1990), we do not refer to the complexity / discreteness of the product (Cohen et al, 2000). In fact, while the first classification regards the knowledge necessary to generate the outcome (product / service), the latter is related to the architecture of final core products. From a theoretical standpoint, both of the explanations are reasonable, and it is likely that no one is incorrect: hence, the total effect may be composed by both a lower negative stigma and higher knowledge relevance for science based start-ups.

Second, results suggest that if the founder has a scientific academic background, the science based new ventures established by such entrepreneur have a higher chance of achieving greater market success, *ceteris paribus*. This is in line with our prediction and shows how scientific competences in this industry have a great relevance. Moreover, the analysis reports that for tech based start-ups founders with an engineering-related degree experience a greater market success only if the number of patents in portfolio is higher than two. Following Cohen et al (2000), such empirical evidence finds justification in the need of tech based start-ups to own more patents (technical capabilities) in order to achieve a market success.

Third, data confirm the hypotheses according to which more patents are correlated with higher market success in tech based start-ups, while the same does not verify for science-based ones. The idea here is that due to the non-discrete nature of final products in tech based firms, technical capabilities are present only when more patents are protected. In fact, in many case these companies need multiple patent to protect only one single final product (Cohen et al, 2000). For science based new ventures, instead, often one single patent covers a new biochemical compound, an innovative molecule, or specific stem cells. Such elements may

represent alone the technical asset that serves as unique antecedent to manufacture related products (Demaine and Fellmeth, 2002). Hence, from a technical standpoint, additional patents usually do not contribute to a more sophisticated or attractive product for science based firms.

Fourth, the empirical results endorse the aforementioned reasoning on complementarity between market and technical firm-level capabilities. In particular, for science based firms results show the presence of a complementarity between patents and trademark. Therefore, marketing capabilities, in conjunction with technical ones, produce an increment in market success terms for this subset of new ventures. Contrariwise, for tech bases start-ups such effect vanishes in favor of a positive correlation between patents' numerosity and market success, coherently with the discussion undertaken above. In fact, the high relevance of patents for tech based firms, due to high degree of modularity of their average products, overshadows the effect of trademarks on market success.

Finally, the econometric analysis provides support for the complementarity between technical capabilities of the entrepreneur (engineering-related background) and the ones of the firm (amount of patents) for tech based firms, while the hypothesized complementarity between market capabilities of the start-up (amount of trademarks) and scientific competences of the founder (science-related background) is not sustained by data. Several different theoretical explanations may apply. One idea could be that especially biotech firms (which mostly likely drive the tendencies for the science based subsample, being the majority) are less affected by common competition effects. In other words, if a biotech firm patents a new biochemical compound (hence ensuring itself a time-limited monopoly for such compound), the same company is likely to gain market success mostly depending on the utility of the drug/product manufactured thanks to the innovative compound. If such product is really

innovative and able to improve life conditions of human beings, clearly marketing capabilities cover a less important role in this picture, at least for the granted monopolistic period.

Following this logic, it might be expectable, instead, that as the start-up gets older, complementarities should become more important due to patents' expiration, and hence augmented competition. Instead, we observe, as predicted, a complementarity effect between technical capabilities of the firm and ones of the entrepreneur, with results showing us a positive and significant interaction coefficient. Hence, in this case, our theoretical mechanism hypothesized in a previous stage finds empirical validation, and suggests that these two components (patents and engineering related degrees) generate together a positive effect which is stronger compared to the sum of the single effects taken in isolation.

To sum up, this paper helps to clarify how different effects on market success can be observed, depending on the nature of core product(s) of the considered start-up. This contributes to the wide literature stream on RBV of the firm and capabilities (Peteraf, 1993; Wernerfelt, 1984; Winter, 2012), by highlighting an important boundary condition represented, indeed, by the core manufactured product. Such distinction has several theoretical and practical implications that will be discussed in the next sections.

Theoretical Implications

This paper includes several theoretical implications. First, it contributes to the literature on the resource based view of the firm by studying in an aggregate manner both firms and individual capabilities that may drive together the market success of new ventures, identifying also the existence of some “golden matches” among capabilities themselves. Second, it sheds additional light on the effects of negative stigmatization and positive

learning, both generated by previous entrepreneurial failures. Data show how the net effect of such components depends on the sector, which adds to the more known contingencies related to the geographical area (Landier, 2005). Third, this article adds to the general literature which addresses driving factors for new ventures growth, survival and success; in other terms, the validated hypotheses contribute to supplement with another piece the complex puzzle of forces that make some ventures having success, and other not. Further, by acknowledging different products-contingent effects of capabilities of the firms, skills and background of the entrepreneurs, we clarify that the nature of the product is an element that must be always taken into account when capabilities are addressed to study market success.

Practical Implications

From a practical standpoint, this article may provide useful insights for many professionals, including entrepreneurs, policy-makers, and venture capitalists.

To begin, entrepreneurs could benefit from knowing in advance how some specific individual skills and capabilities might be important for the success of the start-up he/she is going to establish, allowing a priori to better assess the expected probability of market success. Moreover, policy-makers should encourage a climate that does not excessively stigmatize failure in entrepreneurial terms; in fact, empirical results provide support to the theoretical framework according to which negative stigma can weaken the capacity of collecting financial resources, hence determining a lower likelihood of market success, at least for tech based firms. Promoting and improving the probability of success of start-ups clearly must represent a priority for policy-makers, due to the respective relevance as drivers for the economic growth of many countries (Acs and Szerb, 2007). Finally, most of the takeaways reported in this article are likely to be useful also for venture capitalists: in fact, these actors

are undoubtedly very interested in recognizing which entrepreneurial projects have more chances to achieve great market success. More specifically, this paper may contribute to identify, given different contingencies in terms of industry and geographic collocation, which infant start-ups have a higher chance to accomplish market success in the following years.

Linking to the previous statement, this paper gives a broad advice to all categories of practitioners, evidencing how the nature of product manufactured by a firm is something to take into account; in fact, results show effects of capabilities on the considered start-ups depending on such contingency.

Limitations and Hints for Further Research

As every academic research, also this study presents its own weaknesses and limitations. First, both using patents to address innovativeness and technical capabilities and trademarks for new market competencies, has many limits. It is important to remark that not all technological innovation is patented or patentable: for example, firms that are active in certain industries like the fashion one, are also more likely to opt for secrecy or other tools to protect their intellectual property (Barrère and Delabruyère, 2011). Moreover, patents might be filed also for different purposes rather than protecting a real technological innovation; regarding this issue, we have the case of patent trolls, which are patents filed with the only purpose of creating disputes and get awarded unfair royalties (Fischer and Henkel, 2012). We claim that our sample is less affected by the previously mentioned problems. First, we considered only high-tech sectors, for which the patent protection is stronger. Second, non-practicing entities (those firms that adopt a patent troll-related business model) are usually medium-sized firms (not start-ups) and not so relevant in percentage compared to other companies (Pohlmann and Opitz, 2013). The phenomenon of trademark trolls exists as well,

but it is even less relevant in terms of magnitude compared to the one of patent trolls (Folgers, 2007). Fortunately, we do not encounter the problems of firms using other tools than patent to protect technological innovation when trademarks are taken into account: in fact, one big difference between patent and trademark is that the latter does not imply invention disclosure (Burge, 1999), eliminating de facto the incentives' trade-off. To sum up, despite it is impossible to completely rule out all potential problems related to patents and trademarks analysis, our sampling choices reduce the magnitude of the issue, both for the age of firms and the focal sector taken into consideration.

Another limitation, which was also previously anticipated, is that the sector considered is very narrow, and only European start-ups are considered. However, the sector was carefully selected in order to study the discussed phenomena and selecting European new ventures was crucial to investigate the negative stigma effect. Further research efforts could be spent to assess how previous findings would change if other geographical areas or industries are considered. In a similar vein, it would be interesting to study also how environmental specific contingencies act among different European countries, again in relationship to the investigated effects.

Moreover, an additional weakness of this paper consists in considering only one founder to measure entrepreneurial characteristics. Although this is in line with previous research (e.g. Arora and Nandkumar, 2011), we recognize that such decision implies a necessary loss of information. However, two issues mitigate, at least partially, this limitation: first, by considering only the CEO in case of multiple founders, we collected socio-biographical data on the founder who is likely to enjoy more decisional power, and hence mostly capable of influencing the strategic direction of the new ventures. Second, the amount of start-ups founded by more than one entrepreneur represent the minority of the sample, with

a percentage not higher than 25%. To conclude this aspect, we claim that also finding a way to include information on all founders would have not been an optimal choice in terms of information accuracy: in fact, in that case all founders would have treated as having same relevance and power in respect to the focal organization, which is clearly not the case (Finkelstein, 1992).

In addition, we believe that future research might consider many other dependent variables. This paper considers market success as measure of success for an innovative start-up, but it might be equally interesting to investigate whether the same results would verify if sales growth, survival, or size dependent variables are taken into consideration. Finally, also intriguing would be to investigate whether more complementarities between firms' and founders' capabilities exist, for example the combined effect of MBAs or masters in marketing combined with firms' technical competencies.

CONCLUSION

This paper empirically unveils that for European, R&D-focused, innovative new ventures, being a serial founder is detrimental in terms of expected market success for tech based firms, while no significant effects apply to science based ones. Second, more trademarks in portfolio corresponds to a greater market success for science based start-ups, while more patents correspond to higher market success for tech based ones. Third, results show how a scientific academic background of the entrepreneur is positively correlated with market success for science based start-ups, while an engineering background generates a same-direction effect for tech based ones if the number of detained patent is greater than two. Fourth, this article evidences a positive combined effect of engineering-related degree of the founder, and the amount of patents in portfolio for tech based firms. Finally, while it was

predicted a positive combined effect of science-related degree of the founder and the amount of trademarks in portfolio for science based firms, analyses did not support such claim.

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APPENDIX:

Table A: Classification of university degrees according to five bachelor and five master categories:

b_sc	Biomedical Science, Clinical Science, Computer Applications, Computer Information Systems, Biology, Agriculture, Chemistry, Computer Science, Food Science, Forestry, Information Technology, Mathematics, Meteorology, Microbiology, Molecular Biology, Neuroscience, Nutrition science, Pharmacology, Pharmacy, Physics, Plant Science, Radiologic Technology
b_eng	Architecture, Science in Construction Technology, Engineering (all types)
b_bus	Business Administration, Commerce, Criminal Justice, Economics, Information Systems, Management, Management of Technology, Accountancy, Business and Technology, Construction Management, Hospitality Management, Human Resources Management, Marketing, Risk Management and Insurance, Sports Management
b_med	Pharmacy, Nursing, Podiatry, Medicine, Physical Therapy, Respiratory Therapy, Veterinary
b_hum	Divinity, Fine Arts, Letters, Music, Philosophy, Social Work, American Studies, American Indian Studies, Applied Psychology, Anthropology, Child Advocacy, Clinical Psychology, Forensic Psychology, Criminal Justice, Criminology. Literature, History, International Relations, Journalism, Politics, Psychology, Religion
m_sc	Applied Mathematical Sciences, Bioinformatics, Biotechnology, Chemistry, Computer Applications, Computer Science, IT, Mathematics, Pharmacy, Physics, Applied Cognition and Neuroscience, Bioinformatics,
m_eng	Architecture, City Planning, Engineering (all types), Landscape Architecture, Urban Planning,
m_bus	Accountancy, Accounting and Information Systems, Applied Finance, Business Administration, Business Administration Management of Technology, Business, Business Economics, Commerce, Computational Finance, Economics, Enterprise, Finance, Financial Economics, Health Administration, International Business, International Economics, International Public Policy, Information Management, Information Systems, Management, Public Administration, Public Policy, Quantitative Finance, Real Estate Development, Leadership, Project Management, Risk Management, Supply Chain Management, Statistics,
m_med	Health Science, Medical Science, Medicine, Nursing, Veterinary Science,
m_hum	Applied Psychology, Arts (all subgroups), Athletic Training, Communication Criminal Justice, Design, Divinity, European Law, Fine Arts, International Affairs, Islamic Studies, Jurisprudence, Laws, Letters, Mass Communication and Journalism, Music, Philosophy, Political Science, Psychology, Public Diplomacy, Public Relations, Rabbinic Studies, Religious Education,

**HIT THE NAIL ON THE HEAD:
IMPLEMENTING AND PROMOTING CONTEXTUAL
AMBIDEXTERITY AT AMGEN ITALY**

ABSTRACT

Scholars widely recognize ambidexterity as an essential organizational achievement to both ensure short term rewards and long run prosperity. Our study, through a unique combination of restricted material, archival and performance data, face-to-face interviews, and questionnaires, aims at shedding additional light on the complex ambidexterity issue. In particular, we evidence how specific managerial actions can promote an ambidextrous climate. We benefit from the privileged setting of a multinational subsidiary operating in the biotech industry; the company moved from the lowest position to the top one in only three years, according to an internal ranking on organizational climate. Our results track in details the concrete actions and operative tools that allowed the transformation to take place, evidencing both academic and managerial implications.

INTRODUCTION

“After the merger with a local company (former distributor), Amgen Italy was too focused on short-term financial results only...now employees feel respected, motivated, long-term oriented, the improved organizational environment generates higher profits...I feel much less indispensable now, is it possible to do even better?”
(Francesco Di Marco, Amgen Italy CEO)

The issue of ambidexterity has been largely discussed in the field of strategic management (e.g. March, 1991; Gibson and Birkinshaw, 2004; Raisch and Birkinshaw, 2008). In particular, O’Reilly and Tushman (2008) discuss and analyze how ambidexterity is a dynamic capability itself; in fact, by correctly balancing exploitation and explorations, firms get able to adapt and better face changes of various nature (Taylor and Helfat, 2009). Mergers and acquisitions are organizational events that are also recognized to contribute in both generating and shaping dynamic capabilities (Zollo and Winter, 2002). Moreover, another fundamental condition to successfully implement contextual ambidexterity in a specific company is represented by a management that actively promotes a supportive organizational context (Gibson and Birkinshaw, 2004). Nevertheless, there are not many academic articles that attempt at empirically verifying and measuring such phenomenon, i.e. in which way M&As and effective leadership might boost the formation of an ambidextrous climate in organizations. Scholars explicitly call for additional research that might contribute to clarify how ambidexterity is established, promoted and maintained (e.g. Boumgarden et al, 2012).

Our proposal aims at contributing to the ambidexterity and dynamic capabilities fields by studying how a particular merger and an effective leadership together were able to transform company culture in Amgen Italy, the Italian subsidiary of a large biotech multinational enterprise, and promote a more ambidextrous, long-term focused orientation. Amgen Italy represents a particularly privileged setting to address such issue; in fact, the subsidiary experienced an impactful merger in 2008 and a change of leadership in 2012. From

2012 to 2015, Amgen Italy moved from the worst position to the top one, according to an internal ranking which considers all Amgen subsidiaries in terms of employee satisfaction. Through a unique database composed of publicly available material, restricted and archival documents, 13 in-depth, face-to-face semi-structured interviews with managers and specialized employees, we are able to reconstruct the story of Amgen Italy and disentangle how an ambidextrous culture has been promoted and actualized.

We claim our theoretical contribution to be fourfold: first, we provide additional empirical evidence that M&As combined with an illuminated leadership style might endorse a form of cultural ambidexterity (Tushman and O'Reilly, 1996; Simsek et al, 2009). This is of particular interest for the literature since M&As have been mostly linked to corporate ambidexterity, which is characterized by a higher likelihood of failure (Hill and Birkinshaw, 2014). Second, we shed additional light on the complex interconnections that exist among different organizational processes, routines and climate, which must work synergistically in order to properly establish cultural ambidexterity. Third, we evidence how employees' satisfaction and engagement cover a crucial role in transforming a company culture. Finally, we provide and highlight several operative tools that top management put in action to promote ambidexterity and adaptation to change. In particular, to address this final contribution, we focused on the antecedents of ambidexterity as a dynamic capability (Schilke et al, forthcoming); hence, we keep track of all processes that concretely contributed to the new ambidextrous climate.

Our research embeds also some fruitful managerial implications. In particular, by studying an evident success story that has its departure point on a less admirable and desirable scenario, we provide many interesting insights on how an unsuccessful situation may be completely overturned. Clearly, context and industry specific issue that limit the

generalizability of our takeaways must be taken into account. Furthermore, this paper furnishes several concrete and tangible operative tools that top management may put in action to promote ambidexterity and adaptation to change. Last, by highlighting how certain elements such as leadership style and working climate can affect performance, we hope to motivate managers to more deeply consider these aspects, which are sometimes disregarded by top executives (Hansen and Wernerfelt, 1989).

The rest of this paper is structured as following. First, a literature review paragraph aims at reconciling most important academic discoveries in the field that can help the analysis of the focal phenomenon; such theoretical constructs are also very useful in order to constantly match empirical findings with theory. Second, we provide most relevant historical milestones that help depicting the history of the biotech multinational enterprise; further, key theoretical traits of the historical evolution of Amgen Italy before 2008 are also provided. Third, we illustrate in detail how and which typologies of data are collected, and which methodological processes have been carried out to extrapolate empirical evidence. Fourth, the finding section shows how the evolution of Amgen Italy, in terms of cultural ambidexterity, has been reconstructed; we tried to constantly match constructs with empirical insights, in order to maximize rigor and explanative power of data. Fifth, a discussion paragraph summarizes findings and address limitations, hints for further research, managerial and practical implications. Finally, a conclusive paragraph remarks the most important takeaways of this paper.

THEORETICAL BACKGROUND

Existing literature extensively recognizes the strategic relevance of dynamic capabilities to address and survive change (Helfat et al, 2009). Such capabilities play a crucial

role for firms operating in rapidly changing industries, such as the biotech one, since they have to continuously integrate, build, and reconfigure internal and external competences (Teece et al, 1997). Ambidexterity, i.e. the capacity of pursuing both exploitation and exploration, is a dynamic capability itself (O'Reilly and Tushman, 2008). Previous literature acknowledged that both the abilities of being efficient in the management of today's business (exploitation) and being adaptable for coping with tomorrow's changes (exploration) are crucial for the long-run sustainment of the firm and its related performances (Gibson and Birkinshaw, 2004; He and Wong, 2004). While among scholars there is an almost unanimous opinion about what ambidexterity in general is, such scenario does not verify when different typologies of ambidexterity are taken into account.

Structural ambidexterity usually refers to a separation between exploitation and exploration, which might be at team level (Adler et al, 1999) or at business units level (Siggelkow and Levinthal, 2003); when organizational ambidexterity is achieved through the acquisition of a young exploration-oriented startup, some scholars define this situation also as corporate ambidexterity or a corporate solution to implement ambidexterity (O'Reilly and Tushman, 2008). However, all structural-related solutions have in common the idea that explorative and exploitative activities remained detached, with specific time spans, individual, teams, or division dedicated to some or other activities. This peculiar commonality presents some problematic issue. In fact, establishing a separate team or division is fully dedicated to more explorative activities, which often require a different set of skills and capabilities compared to the ones detained by other employees (O'Reilly and Tushman, 2008), can easily generate mechanisms of internal resistance and negative stigmatization of the explorative team/division (Birkinshaw and Gupta, 2013). This happens essentially for two reasons. First, other employees or divisions, due to discrepancies in core skills and capabilities, may not

understand what the exploratory entity is doing, leading to a discredit of the latter. Second, the promotion of explorative activities based on different competencies may threaten the status of many workers, consequently they may try to resist and contrast exploration (Andriopoulos and Lewis, 2009). In a similar vein, also acquiring a young innovative start-up with the aim of promoting exploration in established companies has several downturns. In fact, literature shows many cases of acquirers that damaged the innovative and explorative traits of the acquired firm (Hayward, 2002).

Contextual ambidexterity, instead, has its theoretical roots into the idea that all employees of a company must do both exploration and exploitation in complementary manner (Raisch et al, 2009); contextual solutions normally require a cultural renewal and a strong ambidextrous orientation of top management (Gibson and Birkinshaw, 2004). Further, such solutions need socialization, human resource, and team-building practices in order to promote shared values and coordination, supporting all organizational players to act ambidextrously every time (Ghoshal and Bartlett 1997). Despite a more difficult and energy-consuming implementation, contextual solutions are more likely to establish a long lasting and robust ambidextrous climate: in fact, contextual ambidexterity is less subject to previously mentioned risks and supports a radical change of mentality that, once established, has great chances to remain rooted in employees' behaviors (Birkinshaw and Gibson, 2004).

Addressing organizational change in a successful manner undoubtedly requires specific managerial skills, particularly at the vertices of the firms (Castanias and Helfat, 1991); further, Rosembloom (2000) explains how dynamic managerial capabilities of some CEOs might be crucial for strategic change. Hence, ambidexterity as a dynamic capability should deeply benefit from managerial paradoxical cognition (Smith and Tushman, 2005)

developed by top management. For a deeper understanding of paradox theory related to exploitation and exploration tensions see Smith and Lewis (2011).

The fact that dynamic managerial capabilities can exert a positive influence on important strategic changes is widely recognized by scholars (e.g. Adner and Helfat, 2003; Helfat and Martin, 2015). In essence, dynamic managerial capabilities perform the same task of dynamic capabilities (i.e. enabling a firm to integrate, build, and reconfigure competences), with the peculiarity of acting at managerial level rather than organizational one; hence dynamic managerial capabilities are defined as: “*the capabilities with which managers build, integrate, and reconfigure organizational resources and competences*” (Adner and Helfat, 2003: 1012). Building on this construct, it is logical to argue how a specific executive board can make the difference for a given firm.

We argue that the newly appointed general manager of Amgen Italy, through his managerial cognitive and dynamic capabilities was able to correctly mediate between changes in organizational context and strategic changes (Helfat and Peteraf, 2015), therefore appointing contextual ambidexterity by promoting a cultural long-run attitude among employees at any level.

Schilke et al (forthcoming) provides a comprehensive framework that addresses the most common antecedents of dynamic capabilities (and, hence, ambidexterity, being a dynamic capability itself). Highlighted antecedents include: experience, implying a direct contact or external observation of phenomena (Chen et al, 2012; Schilke and Goerzen, 2010); organizational structure, which relates to an update of how certain organizational activities are structured in order to reach given goals (Eisenhardt et al, 2010; Felin and Powell, 2016; Schilke and Goerzen, 2010); organizational culture, embedding all the sets of principles,

moral values, and belief of the workforce (Anand et al, 2009; Bock et al, 2012; Song et al, 2016); resources, which reflect both tangible and intangible assets available (Capron and Mitchell, 2009; Salge and Vera, 2013); human capital, a dimension which includes the individual capabilities of human resources (Hsu and Wang, 2012); leadership, i.e. the characteristics of top executives (Kor and Mesko, 2013; Rindova and Kotha, 2001); managerial cognition, which, as anticipated, is related to mental representations of top executives and their ability to metabolize new knowledge (Leiblein, 2011; Smith and Tushman, 2005). Through such comprehensive framework, which constitute also our theoretical lenses to disentangle various drivers of change put in action, we aim at shedding additional light on the processes which may lead to a more cultural ambidextrous environment.

HISTORICAL FRAMEWORK

Amgen Global

Amgen started its operation in 1980 under the name: “Applied Molecular Genetics”. After three years, the previous business name was substituted with its acronym: Amgen. The company, right after incorporation, had as first appointed CEO the scientist and businessman George B. Rathmann. First three years represent an era of huge ferment and experimentation: in that period Amgen scientists were able to extract oil from shale, create new chemical compounds, and discover an innovative process to artificially generate indigo dye in *Escherichia coli*. Then, such period of broad experimentation and wide exploration ceased in favor of a more narrow and defined strategic focus, which lasts also nowadays: treating and curing human diseases.

In 1983, thanks to previous successes achieved in R&D, the biotech start-up managed to collect approximately \$40 million through an IPO, which represented a relatively solid financial endowment to continue operations and grow. The year after Amgen signed a joint venture agreement with Kirin, a pharmaceutical company, with the purpose of starting commercial operations of erythropoietin. In 1988, first Amgen obtained its first US patent grant for recombinant erythropoietin, which represents the active substance of the drug “Epogen”; by the same year, the firm also experienced a change of CEO, with Gordon Binder who covered the position. The previously mentioned “Epogen” drug was approved by the US Food and Drug Administration (FDA) the year after: the medical treatment proved to be effective and suitable for patients affected by anemia in conjunction with serious kidney problems, and for patients under cancer chemotherapy or HIV fighting cares. Johnson and Johnson, a competitor of the biotech firm, also commercialize an equivalent drug under the tradename “Procrit”. Amgen began to move important steps toward its international expansion, by establishing an European headquarters in Lucerne, which will be moved later on to Zug, also in Switzerland. The internationalization process continued at a fast pace, and Amgen managed to open new subsidiaries to cover the European market; a key manufacturing and distribution center was set in Breda, the Netherlands. In 1991, the FDA released to Amgen the approval for another drug, which will turn out to be very successful: “Neupogen”. Lyman et al (2002), through a clinical study, revealed that “Neupogen” is able, on average, to reduce the mortality risk connected to infection of 40% in patients experiencing their immune system suppressed. By that time, the biotech firm wanted to strengthen and formalize its efforts in corporate social responsibility related activities by establishing the Amgen Foundation: in this way, all employees that were already active to social programs became able to operate in a more structured and synergic fashion. The foundation has nowadays the

double purpose of both inspiring the future generation of innovators by focusing on excellence in science education and providing support to the external communities where the multinational operates. In about 25 years, the amount of resources donated by the Foundation to nonprofit organizations overcomes \$200 million.

An important milestone was, then, reached in 1992, when Amgen reaches the first billion in product sales for “Epogen” and “Neupogen” considered together. At that time, the biotech firm was also added to the S&P 500 stock index and it was included in the Fortune 500 list. On overall, Amgen reached the number of 3,396 employees in 1994, with an increment of 3,052 workforce units in only six years. In 1994 the firm was also awarded with the U.S. Department of Commerce National Medal of Technology; being the first biotech company to achieve the recognition. In 1996 Amgen by changing its mission statement into: “To be the world leader in developing and delivering important, cost-effective therapeutics based on advances in cellular and molecular biology”, wanted to remark its focus on both efficiency and innovation. Amgen, then, finalizes in 2002 the acquisition of Immunex, another biotech organization that started to commercialize four years before “Enbrel” the first rheumatoid arthritis drug that addresses tumor necrosis factor alpha. Morgan et al (2013) showed how this drug may improve the life quality of patients affected by the previously mentioned pathology, associated with a higher survival likelihood, a lower incidence of cardiovascular-related problems and hematological cancers. In 2000, Kevin W. Sharer became the newly appointed CEO of Amgen, being himself the third one since incorporation date. The year after, the biotech company managed to accomplish a partnership with the US National Aeronautics and Space Administration, with the purpose of studying in the space, a decoy receptor for the receptor activator of nuclear factor kappa B ligand (Wong et al, 1997). Then, Amgen continued with its acquisition strategy and after Immunex, also Tularik, a high-

science company focused on grievous illnesses, was incorporated by the biotech company. In 2005, Amgen signed a partnership agreement with four non-profit organizations, with the ultimate purpose of promoting various initiatives to increase awareness of important resources available to patients affected by cancer; the whole operation was named: “Breakaway from Cancer”. By the next year, a cooperation agreement with “Brigham and Women’s Hospital” and “NIH’s National Heart, Lung, and Blood Institute on the Women’s Genome Health Study” was signed with the purpose of identifying genetic variations that may underlie a range of serious illnesses such as heart disease, stroke, diabetes, breast cancer and osteoporosis. An additional partnership with the Massachusetts Institute of Technology signed the year after, was promoted with the scope of guaranteeing young undergraduates the access to research experiences in biotechnology.

In 2010, two additional drugs were added to the product portfolio of Amgen: Prolia, a protein drug addressed to those patients who suffer of osteoporosis due to menopause and Xgeva, a drug aimed at avoiding bone metastases complications for patients affected by solid tumors. By next year, the biotech firm also signed a partnership agreement with CDC and CDC Foundation, with the aim of preparing, protecting, and controlling infections for cancer patients. Also in 2011, Amgen manifested its intention of expanding to Latin America by acquiring a privately held Brazilian pharmaceutical company. Robert A. Bradway became the Amgen’s fourth CEO in 2012, a year that was also characterized by many additional strategic partnership and acquisitions: for the sake of this historical section we report the acquisition of deCode Genetics, a global leader in human genetics, the joint venture between Amgen and AstraZeneca to develop and commercialize together five monoclonal antibodies, the acquisition of Micromet Inc., KAI Pharmaceuticals, and Mustafa Nevzat, a leading privately held Turkish pharmaceutical company. The company wanted also to colonize the Asian

market through the Amgen – Astellas BioPharma K.K. alliance formed in Japan and the Amgen-Betta Pharmaceuticals joint venture established in China both in 2013. Amgen turned 35 and many other acquisitions, FDA approvals, joint venture, socially oriented initiatives was accomplished.

Key numbers as 2015 indicate a total workforce of about 18,000 employees, total revenues of approximately \$21.7 billion, and R&D expenses close to \$3.9 billion; net profits reached the level of \$7 billion for the fiscal year. The headquarter of Amgen is actually located in Thousand Oaks, California, where the firm was established, and it mainly operates in the biotech and pharmaceutical industry. Most successful commercialized drugs belong to the fields of oncology, hematology, cardiovascular, inflammation, bone health, nephrology, and neuroscience. According to Yahoo Finance, most relevant competitors include but are not limited to Roche, Johnson & Johnson, Merck, Sandoz, Teva Pharmaceutical Industries Limited. In 2016, Amgen also achieved the awards of being the resilient supply chain industry leader of the year in the life sciences industry, the 18th most innovative company according to Fast Company magazine, and the 7th world's most admired company in the pharmaceutical sector according to Fortune.

Amgen Italy

Among European subsidiaries, the Italian one is third in terms of size (\$249,6 million of sales in 2015), after France, and Germany. Amgen opened its commercial Italian subsidiary in October 2002; before 2002, the company was active in Italy only with R&D services and its products were sold through a local distributor (Dompé). During the period 2002-2008 Amgen and Dompé were running their operation following a co-marketing model: both

companies used to commercialize very similar products in Italy with different names and brands.

Amgen Italy at that time had two different faces. In fact, some aspects were the typical start-up ones: corporate climate and culture not very delineated, routines not established and lack of a strong identity. Still, Amgen Italy was not only a start-up but also a subsidiary of a US multinational enterprise: such peculiarity allowed hiring highly specialized professional profiles from other big pharmaceutical firms operating in Italy, offering them higher than industry average remuneration packages. All these elements, together with a rather stable leadership (in the period 2002-2008 only two CEOs were appointed to Amgen Italy from the headquarter), allowed the small firm to grow fast, moving from zero revenues and 20 employees in 2002 to 130 million of euro in revenues and about 160 employees by the end of 2007.

Although prosperous in the early years, the adopted co-marketing model revealed its inefficiencies for both players in the long run: the two firms that offered very similar drugs risked to cannibalize each other, embracing in a price war that could disadvantage both. Such possibility became even more tangible due to the fact that the legal setting in Italy changed, so in 2007 equivalent drugs started to be selected for hospitals according to public tenders:

“It was undoubtedly not possible to go ahead with the co-marketing model; external conditions were changing and we needed to change as well: merger was the thing to do” (Financial Director).

Consequently, Amgen decided to reform his business presence in Italy, by negotiating and accomplishing a merger in 2008 with the former local distributor. By that time, the co-marketing ceased and Amgen became a unique entity. After the merger, it starts the period we chose for the analysis.

DATA AND METHODOLOGY

To address our research question, we decided to adopt an in-depth case study approach, following other articles that focused on various aspects related to ambidexterity (Adler et al, 1999; Han, 2007; Im and Rai, 2008). Such methodology is widely accepted and implemented also to address the development and use of dynamic capabilities (e.g. Danneels, 2011; Rosenbloom, 2000). Single case studies are particularly valuable for richness (Weick, 2007) and persuasive power (Siggelkow, 2007). The biotech industry has previously proven to be a privileged sector to study ambidexterity (Cao et al, 2009; Rothaermel and Alexandre, 2009), and in particular contextual ambidexterity (McCarthy and Gordon, 2011).

Furthermore, Amgen Italy has the specific advantage of offering us a unique perspective of a firm that implemented contextual ambidexterity from the scratch, moving from a situation of low employee satisfaction, short-term orientation to a scenario characterized by high employee satisfaction and long-run focus. Hence, we are able to perform, in a certain sense, a comparative case study of polar types of similarities (Eisenhardt, 1989) by considering the same firm, but on different periods. This is something new in the literature; in fact, while comparative case studies of polar types of similarities offer the great advantage of isolating single elements and then contrasting each other, such technique has the downturn that, despite researchers strive for finding the most similar possible cases, unavoidable differences could bias the result (Meyer, 2001). In this case, by taking into consideration the same firm, but at different time periods, we benefit from the advantages carried out by the aforementioned technique and we simultaneously almost eliminate the confounding effects related to inter-firms' individual peculiarities.

Our research methodology is unfolding in three steps. First, we collected a comprehensive dataset of on-line publicly available material and restricted information for the period 2008-2016; such data include Great Place to Work (GPTW) reports, budget and accounting information, strategic plans, transcripts of GM public speeches, key performance indicators, global annual reports, private e-mails, internal and confidential presentations¹. Secondly, we conducted 13 in-depth interviews to both managers and employees who occupy a key role in the company transformation (e.g. HR director). All interviews have been conducted face-to-face, and we recorded and transcribed all the content. Conducting interviews in face-to-face ways allowed us to grasp also sentiments, feelings, perceptions that would not have been possible to catch through only words: in fact, we were able to observe the gestures of the interviewed while talking about some issues (such as the organizational climate in 2008), and this significantly contributed to identify ourselves with specific situations. Regarding this previous point, it could be useful to remark that all interviews have been handled by the authors, with no use of any research assistant, in order to keep strong control of the whole research process.

Interviews follow a semi-structured approach, in order to reduce a possible mental bias of the interviewer and to permit unexpected concepts to come out (Galletta, 2013; Irvine et al, 2013). Table A in the appendix lists the role of interviewed and the duration of each interview; names of the focal employees have been obscured for privacy reasons. Interviews here have the double purpose of verifying takeaways acquired from the previously mentioned dataset and to explore new insights. We then wrote memos, analytical notes aimed at reporting most relevant insights acquired from data analysis (Strauss, 1987). In this way, theoretical statements and empirical findings are continuously compared and matched, in

¹ Authors are thankful to Mr. Di Marco for having granted them privileged access to private and restricted company material.

order to increase robustness and accuracy of our conclusion; as such process went ahead, we obtained systematically more relevant and precise memos (Danneels, 2011). Third, we prepared a questionnaire dispensed to the interviewed in order to confirm and double-check the change in terms of employee satisfaction reported by GPTW; to ensure non-biased and honest answers such questionnaires have been completely anonymized.

The following chapter summarizes key empirical findings and tracks all the relevant strategic initiatives put in actions to implant an organizational climate that promotes contextual ambidexterity.

FINDINGS

Rags to Riches

Organizational climate after the impactful shock of 2008, year when Amgen merged with Dompé, was, to say the least, turbulent and haywire. In fact, new Amgen Italy workforce was shrunk of approximately 50%, with about one hundred employees who lost their job place, due to the duplication of products existing in the previously separated entities. Moreover, such scenario was totally unexpected, since top management only few months before used to reassure workers that the deal would have not significantly impacted employment levels. A taste of the climate that was prevailing by that time can be perceived through the words used by interviewed, often very harsh and direct:

“Going to work the day after, and finding so many empty seats contributed to generate a climate of terror and distrust” (Product Specialist)

To make matters even more challenging, right after the merger, a severe problem of scarce harmonization between the two different existing cultures also began to impend over the so tense working climate. In fact, while Amgen had the typical traits of a US multinational

subsidiary, characterized by a global vision and used to receive some strategic directions from the headquarter, Dompé reflected its background of a traditional family run business operating only in the local Italian market. Such contingency implied the presence of two contrasting souls in the same organization, making it very difficult to share the same daily working environment. Cultural fit and integration capabilities are recognized as key facilitating factors in accomplishing a successful merger or acquisition (Bauer and Matzler, 2014), and an absence of the previous may contribute to generate a negative organizational climate.

“Right after the merger, in 2008, there was a strong problem of harmonization between the two realities. There was a climate of terror and competition was insane. Then, in 2012, the new GM tried to establish a better climate, promoting employees’ retention and dedicating more attention to each single human resource.” (HR Manager)

“After the merger, two different realities coexisted. The new GM in 2012, through a totally different leadership style, attempted at establishing a more cooperative and horizontal working climate” (HR Manager)

As the quotes suggest, a new general manager was appointed by the Thousand Oaks headquarter in 2012, and he attempted at changing Amgen Italy. The starting point was clearly not the luckiest one. One unambiguous signal of an untrustworthy environment was the cold welcome the new GM received: together with the top management team, he organized an event in January 2012, right after his nomination, and Mr. Luca di Montezemolo was invited as a prestigious outside speaker. The reaction of Amgen employees to the speeches of both Mr. Montezemolo and Mr. Di Marco showed a deep malcontent. Then, a union representative took the floor during the plenary reunion and manifested dissent for the unpleased situation where Amgen employees stuck. Top executives were almost forced to leave him the stage and he read a long letter, through which the large majority of the Amgen’s workforce declared a sense of distrust and dissatisfaction for the strategic directions

undertook by the Italian subsidiary. The public awarded him with a standing ovation, remarking the almost unanimous agreement with the words contained in that letter:

“Right after the appointment of the new GM, during a convention with Mr. Montezemolo a delegation of Amgen Italy employees read a letter in which workers declared a lack of listening skills and empathy by top management.” (HR Manager)

The newly appointed GM recognized also a working climate that was only able to barely sustain short-term activities; clearly, an almost sole focus on exploitation, despite it might have invisible effects on today’s performances, can have severe consequences in the long run (Fang et al, 2010). Indeed, employee were generally dissatisfied and approached the daily workload as something that must be accomplished in the quickest way and in order to maximize immediate returns. Things changed after 2012 and the new GM was able to transform Amgen Italy into a more ambidextrous organization. It is useful to highlight how monetary incentives were not part of the problem:

“Before the appointment of the new GM, the firm was too much focused on short-term results only, all routines and process established had such unique aim. Now things are changed: clearly, we still have pressures to short-run financial objectives, but the subsidiary has also an overall view capable to look also at the future.” (District Manager)

“In 2013 Amgen Italy implemented a restructuring according to the archetype model in order to contribute to the long-run product strategies. This was a clear point of improvement in respect to the past.” (District Manager)

“Remuneration was great, but we had very few possibilities in terms of career and internal/external mobility; this, together with other factors, generated an environment which was very good for the short run but represented a big question mark for the long run sustainment.” (Medical Director)

As anticipated before, this case study provides an additional support to the literature which recognize monetary incentives to employees as not always the best solution to motivate workers, and such incentives sometimes may also have counterproductive and unintended consequences in respect to the ones expected by top executives (e.g. Baker et al, 1988; Bonner and Sprinkle, 2002; Frey and Osterloh, 2001).

By looking at documents and interviews, we are able to recognize some specific traits of the contextual ambidexterity: “[Contextual] ambidexterity is the behavioral capacity to simultaneously demonstrate alignment and adaptability across an entire business unit” (Gibson and Birkinshaw, 2004). Such theoretical statement appears very close to what we observe in Amgen Italy nowadays:

“My first impressions when I entered the Amgen community [2016] include a familiar environment, a cooperative organizational climate, and general perception of trust among colleagues.” (Product Specialist)

“Way of work now is completely different from the past. There is a climate of trust and transparency, management is open-minded, our work is performances-based and not time-based, we do not even punch in and out. GM made the difference, he believes in the well-being of people: examples are a time slot for massages, match of football table, ice cream stalls, carnival business party. On overall, there is a greater cohesion among employees and the structure is highly horizontal, there are no formalities to communicate with the top management.” (Project Manager)

“Future challenges include the renewal of our product portfolio. I bet we will face such challenge, because Amgen nowadays embeds the culture of change, we are more open to what is new and unknown, and we trust each other.” (Medical Director)

Gibson and Birkinshaw (2004) claim that an organizational climate characterized by a combination of stretch, discipline, support, and trust facilitates contextual ambidexterity. We showed how the newly appointed GM was able to generate a similar climate, transforming a seemingly devastating merger into a great opportunity to exploit different cultures and harmonize those into a renewed way of working. What is more interesting at this point, both from an academic and managerial perspective, is to investigate on the concrete actions carried out to accomplish such result. In other words, our intention is to reconstruct the whole chain of events that finally led to a more ambidextrous organization. Next paragraphs aim at unveiling these processes.

Change implementation

“The change management team did not handle in the best possible way the transition stage after the JV settlement.” (GM)

The GM, once become fully aware of the unpleasant working climate in 2012, urgently endorsed corrective measures to revert the unsatisfying organizational scenario and recover value. He explained us that there was the necessity to implement corrective measure in a quick fashion, in order to avoid that the future of the subsidiary would have been compromised. The GM acknowledged the following priorities: (1) keep performance under control to harmonize tension toward business targets and people motivation; (2) upgrade the organizational structure by adopting a less hierarchical model; (3) urgently improve the organizational climate at all levels. As consequence, from an operative point of view, six work streams have been established, each one with a specific aim: leadership and talent management, simplification, delegation, cross-functional cooperation, social engagement, internal communication.

Interventions on leadership and talent management were mainly focused on differed human resource practices. In particular, the previous tendency of hiring well-trained people from competitors was reverted, and Amgen Italy began to train in-house from the scratch freshly graduated personnel. In this way, the company enhance the likelihood of compliance with Amgen values and generated the perception that the organization want to strongly invest on its people. In line with this aim, a higher budget was dedicated to HR development:

“Before 2012 the company used to hire only people with certain experience, avoiding to invest on human resources by promoting training and internal formation. Now people receive formation from the scratch, most of new employees get hired right after their graduation.” (Medical Director)

Several many efforts have been addressed attempting to revert the trend of just recruiting people with multi-year experience in Pharmaceutical by training human resources from the very early stage of their professional life, investing on their education, and instilling them a long-term orientation of their daily business activities.

Concerning simplification, many organizational procedures were re-engineered, in the spirit of reducing bureaucracy: routines have been redesigned and all employees at any level had the chance to take decisions in quicker fashion. In this way, people started to feel more empowered and aware of their responsibility.

Delegation also covered a key role in reshaping the company culture. The delegation team designed new governance and redefined the principles of the organizational structure of Amgen. A major change was the adoption of a clustering criterion to group organizational unit in the territory, to streamline decision-making and identify responsibilities. Then, major decision-making processes were revised, identifying the role played by managers and their staff in contributing, giving advice, being informed, and taking the decision. Such distinction contributed to set more clear responsibilities to the key roles within the organizational structure.

The cross-functional work stream had the purpose of promoting communication and cooperation across teams, overcoming the “silos-based” functional structure, which was previously conceived to maximize short-term returns. By encouraging interchanges among divisions, Amgen had the change of benefiting from both immediate profitability ensured by existing functional excellence and future, less certain performance achievements triggered by explorative cross-functional cooperation.

Volunteers and the CFO composed the social engagement team. Initiatives to be undertaken have been selected on a yearly basis and team members worked to realize selected projects. Examples of initiatives carried out in this setting are recreational events, cultural activities of different types, collective participation to the food aid program during working hours, creation of aggregation moments. Being engaged together with colleagues in

recreational and solidary activities enhanced the team spirit; hence, such more cohesive atmosphere contributes to develop a long-run vision of working activities:

“We obviously cannot say that now everything is perfect. Long-run strategies could be even improved, and cultural aspects need a further reshaping. However, we are undoubtedly going into the right direction, social initiatives promoted a sense of community, which helps us to look far away.” (HR Manager).

Finally, GM and other managers engaged in regular communications with other employees. Quarterly meetings with leaders, meetings with all staff, structured cascading communications aids were planned and executed. GM regularly met employees, irrespective of level and grades, in order to address problems and consider eventual change proposals.

Results of the six work streams started to show their impact very soon: people were empowered and able to make important decision in autonomy, it became easy to contact top managers in leaner and less bureaucratic way.

Antecedents of Ambidexterity

At this stage, our intention is to identify, for each work stream implemented, the concrete actions or processes carried on, and its outcome. In order to clarify how each single outcome, which is part of the new strategic orientation of Amgen Italy, contributed to the establishment of an ambidextrous climate, we matched empirical findings with theory, reconducting each single action (which is part of a work stream) to a specific antecedent of dynamic capabilities. Remarking that ambidexterity is a dynamic capability itself (O’Reilly and Tushman, 2008), in this way we reconstruct and shed light on all the steps of the macro process which led to organizational ambidexterity, identifying its microfoundation.

For the sake of this analysis, we report again seven out of the ten groups of antecedents of dynamic capabilities identified by Schilke et al (forthcoming): experience

(Chen et al, 2012; Schilke and Goerzen, 2010), organizational structure (Eisenhardt et al, 2010; Felin and Powell, 2016; Schilke and Goerzen, 2010), resources (Capron and Mitchell, 2009; Salge and Vera, 2013), organizational culture (Anand et al, 2009; Bock et al, 2012; Song et al, 2016), human capital (Hsu and Wang, 2012), leadership (Kor and Mesko, 2013; Rindova and Kotha, 2001), managerial cognition (Leiblein, 2011; Smith and Tushman, 2005). These seven antecedents represent the ones applicable to our empirical framework.

The following paragraphs aim at analyzing for each work stream the concrete activity undertaken by the company, their implications, and the antecedents of ambidexterity activated. Table 1 summarizes these findings, Figure 1 focuses on the relationships among work streams, antecedents of ambidexterity, and contextual ambidexterity itself.

Leadership and Talent Management

Through the establishment of the leadership and talent management work stream, Amgen Italy, as anticipated, wanted to change the human resource practices in use. In essence, while before the firm usually hired professionals who already achieved several career advancements by working for many years in the biotech and pharmaceutical industries, now the HR department focused more on attracting people directly from university, right after graduation. In parallel, the company promoted several training programs aimed at promoting a convergence of values and belief between the firm itself and the workforce. In this way, Amgen both managed to better align established employees to the organizational culture and also benefited from fresh graduates, who are more likely to absorb values, norms and belief of the biotech multinational. Further, the GM decided to allocate more financial resources to the HR department, in order to promote high quality formation and a more accurate hiring process.

Results of this work stream include a more motivated and long-term oriented workforce.

About this issue, it is also not negligible to note that people who are at the beginning of their career are more likely to adopt a long-run focus, due to the greater working years ahead. All these initiatives undertaken favored an improved organizational culture, implied an increase in terms of available resources, and generated more knowledge through the experience of traineeship programs. All these antecedents contributed to a more ambidextrous orientation.

Simplification

The simplification work stream had, as main objective, the streamlining of many organizational processes that for many years have been too bureaucratic and inefficient. In particular, before 2012 the company suffered from a too formal structure that forced employees to face numerous steps before finalizing a decision of any kind. Such intricate mechanism implied both a suboptimal use of time and also lower employees' satisfaction; in fact, workers used to feel demotivated by the complicate routines they had to face on a daily basis.

The transformation of procedures implied a quicker decision-making process and leaner interactions for all employees at any level of the organizational hierarchy, instilling at the same time both a sense of autonomy and empowerment. The implemented simplification had implications on the organizational structure, making it more horizontal and lean, on the organizational culture, contributing to a more proactive working climate, and on leadership, because top executive started to interact in a more direct and frequent way with all employees. Such transformation went in favor of a more long-run oriented vision.

Delegation

This third work stream, which has also some connections with the previous one, was established with the intention of better identifying responsibilities and, at the same time, allow employees to make also important decisions in quick manner. Concrete actions carried out include the adoption of a clustering criterion to group organizational unit in the territory; in this way, members of teams were enabled to implement changes in a more agile fashion, and the promoter of such change could be much more easily identifies.

As consequence, the company started to have more clear and uniquely determined role, with the advantage for all workers to know ex ante who are the referents for a specific issue or project. Such more transparent and less ambiguous setting contribute to enhance the sense of trust and reliance toward top executives. Clearly, such cultural change had important implications in terms of both leadership and managerial cognition, with top and middle managers who necessitated adapting to a different architecture and way to handle processes. Hence, the organizational structure became more horizontal and a more transparent organizational culture was promoted. These transformations all together represented important precursors of contextual ambidexterity.

Cross-functional cooperation

A cross-functional cooperation work stream was established in order cope with the abundant complaints of a too closed and disconnected structure, which made behave each single team or division as it was an organization itself, with its practices and goals to achieve. In essence, teams and division partially lack an overall view of Amgen Italy, and this clearly represents a problem for an organization that aims at concurring all together to a common objective. Usually employees started to use the work “silo”, to indicate the various teams and

divisions, meaning exactly that such silos operated like a watertight compartment, with very few interconnections and information exchanges among each other.

Hence, after 2012 communication across teams was strongly encouraged, also by promoting a higher rotation rate and setting common projects for which two or more teams had to cooperate together to reach a common final aim. Such actions had clearly positive social implications but also, most importantly, Amgen Italy had the chance to undertake more explorative, across-department projects characterized by long-run expected returns. In other words, the company triggered the creation of horizontal linkages and boundary spanning elements among “silos”, making them more open and permeable. Such transformation implied undoubtedly a change in the organizational structure, due to the cross-functional linkages created, but also a shift in the existing organizational culture was necessary; in fact, employees needed to develop a more open and collaborative mentality. These aspects clearly contributed to the global ambidextrous climate.

Social Engagement

“When I arrived at Amgen Italy, I saw people’s faces, and I realized that employees here were quite unhappy, or, better, they were satisfied for the fact that they were working for an important biotech multinational, but they were not enjoying spending time with their colleagues in that building. People wanted only to finish their daily tasks, and they were doing this very well, nothing to say about that. [...] So I thought to myself and I realized that here people were not having fun at work, and this is unacceptable!” (GM)

The newly appointed General Manager promoted with particular emphasis the social engagement work stream. In fact, he told us that the working climate was not the best one for the promotion of long term vision and to create a fertile and productive environment. In order to remark the willingness to give high relevance to this work stream, the GM included also the financial director in the dedicated team. Other members were included on a voluntary basis.

Members of this work stream promoted a series of recreational events, cultural activities of different types, collective participation to the food aid program during working hours, creation of aggregation moments. Participation to these activities was particularly high and initiatives collected a significant degree of success. A more cohesive group deeply contributed to an improvement on the working climate. More resources, a renewed organizational culture, a more motivated and envisioned human capital pushed Amgen Italy toward a more ambidextrous paradigm.

Internal Communication

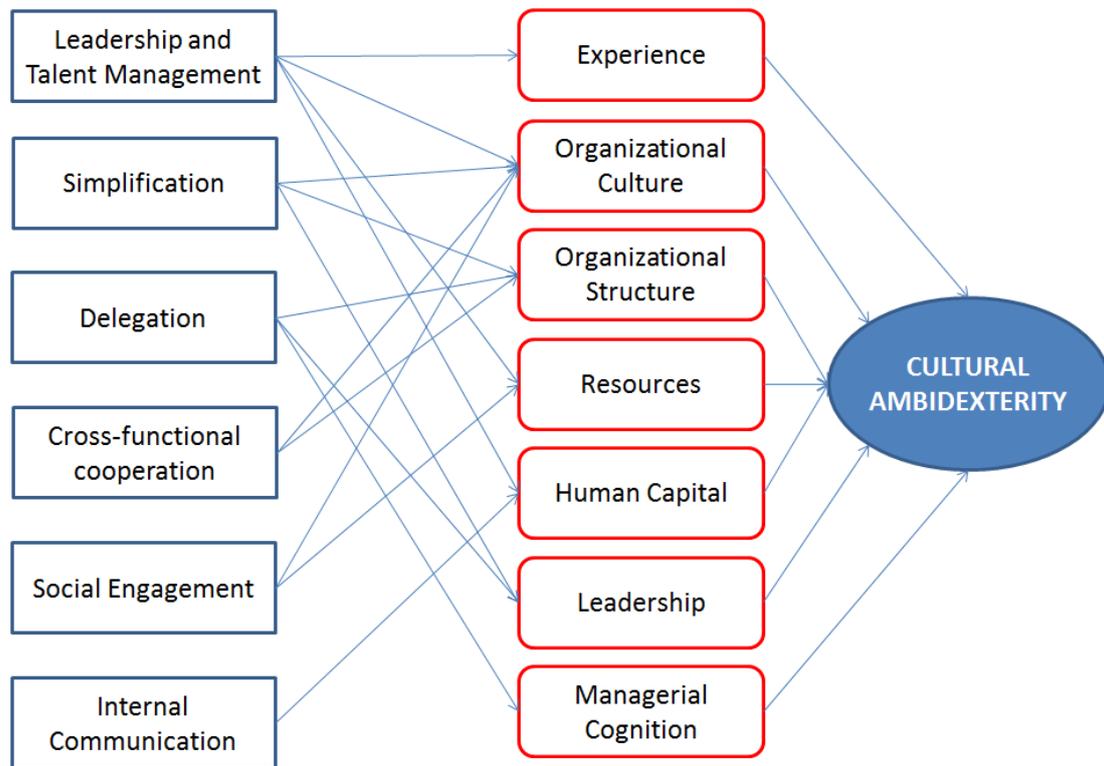
Additional and more exhaustive internal communication was also perceived as something that was missing. In fact, employees complained about the difficulty sometimes to approach top executives, and the existence of a series of information asymmetry between the vertices of the organization and the basement. Such issue contributed to generate a sense of distrust and detachment from top managers, who were perceived as an autonomous entity, which is not aware of the daily problematics encountered at work.

Hence, also this problem was addressed, and Amgen Italy put in actions several initiatives to try to provide a solution. After the establishment of the internal communication work stream, quarterly meeting with top executives were regularly scheduled, together with all-employees meetings and the development of specific tools to rapidly contact and present problems to the vertices of the organization. Such transformation required several efforts from managers and top executive, who had to develop greater managerial cognition and a more horizontal leadership style. Results include the creation of a more positive organizational climate which helped Amgen Italy to be more ambidextrous.

Table 1. Work streams, concrete activities, results, and related antecedents of ambidexterity.

Work Stream	Ambidexterity Antecedents Activated	Concrete Activities Carried on	Result
Leadership and Talent Management	Human Capital, Experience	In-house training for employees	More values-compliant workforce
	Resources, Human Capital	Higher budget dedicated to HR development	Higher precision in selecting the right person and better care of actual employees
	Human Capital, Organizational Culture	Hiring of fresh graduates	More values-compliant and long-term oriented workforce
Simplification	Leadership, Organizational Structure, Organizational Culture	Reduced bureaucracy, quicker decision making	Employee feel more empowered and aware of their responsibility
	Organizational Structure	Routines redesigned in leaner fashion	More efficiency, less time to handle daily processes
Delegation	Managerial Cognition, Organizational Structure	Clustering criterion to group organizational unit in the territory	Decision-making processes streamlined and responsibilities more easily identified
	Leadership, Organizational Structure	Role played by managers and their staff in contributing / giving advice / being informed are clearly reported	More clear responsibilities and identifiable processes
Cross-functional cooperation	Organizational Culture, Organizational Structure	Promoting communication and cooperation across teams, through various incentives	Overcoming of the silos-based structure focused on short-term returns only
Social Engagement	Organizational Culture, Resources, Human Capital	Recreational events, cultural activities, and aggregation moments during working hours	Enhancement of team spirit, sense of common belonging, share vision
Internal Communication	Managerial Cognition, Leadership, Organizational Culture	Quarterly meetings with leaders, meetings with all staff, structured cascading communications aids	More trust toward top executives, faster and more efficient problem-solving

Figure 1. Six work streams, antecedent of ambidexterity, and final outcome.



A look at Performances

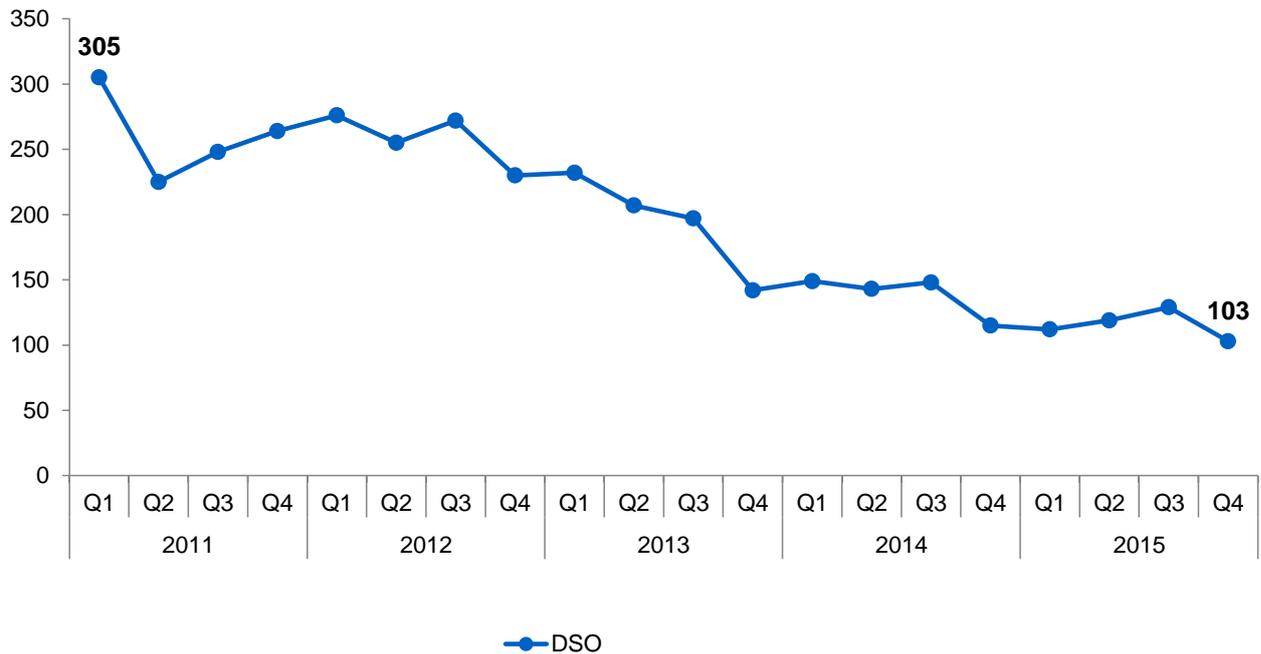
Despite one might be tempted to directly use performances as a key dependent variable of our study, it is crucial to be cautious, since that approach would suffer of three main weaknesses. First, a direct assessment of dynamic capabilities with their related performances might be tautological and meaningless for the sake of the analysis (Helfat et al, 2009). Second, the positive effects of ambidexterity do not manifest in the short run. Rather, due to its peculiarity of promoting the allocation of some resources to explorative activities, which can potentially generate revenues in the long run, an immediate application of the ambidexterity principle may result even in lower short term performances compared to an aggressive, purely exploitative strategy (Raisch and Birkinshaw, 2008). For this reason, measuring the success of an ambidextrous strategy implementation with short term financial

success might inadequate or even counterproductive. However, the strategic changes undertaken at Amgen Italy had also the consequence of improving the organizational climate, which literature recognizes having a more direct impact of performances (e.g. Brown and Leigh, 1996; Hansen and Wernerfelt, 1989). Thus, despite being aware that performance indicators in this picture are not good proxies for assessing the success of the strategic change, we believe that it is still worth to mention some financial data to evaluate, at least, the positive effects of a better organizational climate.

At this point the third problem appears: being Amgen Italy a subsidiary of a multinational enterprise, profits are not representative of real performances, due to potential mechanisms of transfer pricing adopted by multinationals (Grubert and Mutti, 1991). In respect to this last potential problematic issue, we partially solved it by gaining access to the annual results versus budget of the Italian division. This indicator is probably the best performance index, since it compares the actual revenues with the target ones, agreed with the headquarter. Confidential data highlights percentages respectively for the period 2011-2015 of -8%, -3%, -11%, +2%, +3%. This implies that starting from 2014, the company exceeded target performances; such result, considering the long run effects of ambidexterity on performances, is undoubtedly an encouraging result achieved.

Further, from a working capital perspective, the subsidiary also managed to improve performances. Figure 2 shows the evolution of the “days sales outstanding” (DSO) index, again from 2011 to 2015, illustrating an improvement of the capacity to manage accounts receivables.

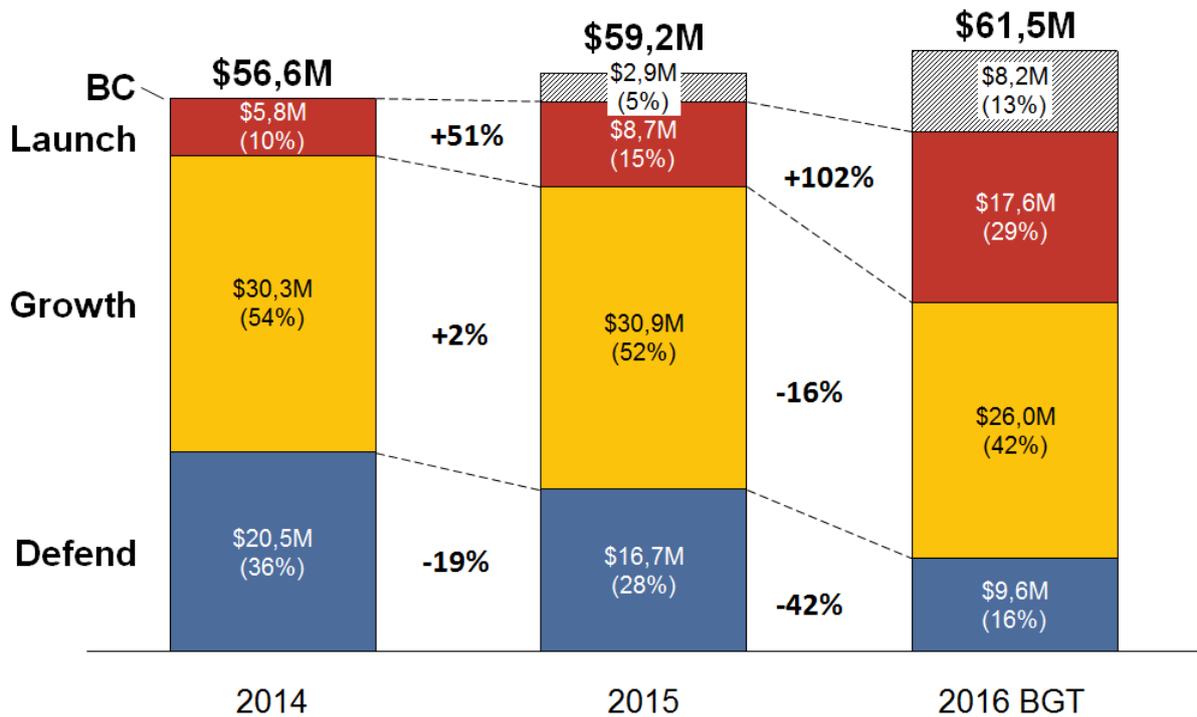
Figure 2. DSO evolution for Amgen Italy, period 2011-2015.



This scenario suggests an intriguing interpretation: while ambidexterity itself, through the allocation of some resources in activities or project which are expected to generate positive financial rewards only in the long run, generally reduces short-term performances of the firm, in this specific case the raise in employees' satisfaction generated a performances' increase that compensates the immediate effect of ambidexterity implementation.

In other words, contrariwise to what generally is supposed to happen right after ambidexterity implementation, Amgen Italy managed to improve its short term results. Figure 3 confirms the tendency of investing constantly more resources to the launch on new products and the development of new business cases, related to uncertain and highly explorative projects. Instead, consequently, the same figure suggests that expenses for defending are being reduced over time.

Figure 3. Heavy Resources Shift to Sustain Future Growth.



DISCUSSION

Thanks to a meticulous and carefully handled study of Amgen Italy, we are able to reconstruct the key steps that transformed the company from a short-term focused, low employee satisfaction subsidiary, to a renewed ambidextrous firm characterized by a high level by employees' satisfaction. Amgen Italy jumped from the lowest position among subsidiaries in terms of employees' satisfaction, to the top one. Quotes and data collected from written material confirm that a proper leadership style after a relevant merger was able to promote contextual ambidexterity. In fact, data show how the six work streams contributed to generate an ambidextrous environment, through the activation of seven distinct antecedents of dynamic capabilities. In particular, we highlight how a better climate, an efficient delegation system, a less bureaucratic and more horizontal structure, more communication among teams and with top management, social engagement, and a more frequent and effective

internal communication may promote an ambidextrous context. In terms of HR best practices, our data also show support for a positive relationship between investing more in employees' training and retention, and a long-run orientation. The conception of work streams proven being a successful operative method to accomplish the desired transformation, despite it is impossible to claim that such implementation of chance will be the best one for all industries or even firms operating in the same sector. We will discuss the generalizability of our findings in the limitation paragraph.

Theoretical Implications

As anticipated in the introduction, our study mainly contributes in four distinct manners. To begin, the unique contingencies of the focal company allowed us to unveil how M&As, together with a change in strategic orientation can promote contextual ambidexterity (Tushman and O'Reilly, 1996; Simsek et al, 2009). Hence, we contribute to the literature of M&As and ambidexterity by showing how such deals might be also precursors of contextual implementations of Ambidexterity, rather just structural ones. Then, we empirically show how organizational processes, routines and climate are tightly interdependent, and a successful ambidextrous transformation depends on how all the chain react and spend energies to comply with the new strategic orientation. Further, we provide additional evidence on how a better climate is likely to enhance financial performances, in addition to be fundamental for transforming a company culture and establish an ambidextrous orientation.

Finally, by analyzing the work streams as operative tools to activate antecedents of ambidexterity as a dynamic capability, we contribute to two claims for further research mentioned by Schilke et al, (forthcoming), i.e. the necessity of deepening the understanding

about microfoundations of dynamic capabilities, and reorienting the analysis of dynamic capabilities' consequences to different outcomes, rather than performances only.

Practical Implications

We decided to focus our research efforts on this specific case study also for the potential managerial implications. In fact, we claim that our insights may essentially contribute to practitioners in three ways. First, we show how an unsuccessful situation may be completely overturned: hence, at least from an employees' satisfaction point of view, this is an undisputable rags to riches story, which has its roots into a not so desirable scenario.

Second, by documenting in details all the concrete initiatives and processes initiated by top executives to undertake the transformation, we provide a benchmark toolkit that executives may implement to promote contextual ambidexterity. Undoubtedly, as mentioned before, we do not claim that blindly embracing in all the operative steps described before, would lead to a successful ambidexterity implementation in all organizations. Third, by unveiling and providing additional confirmation for a potential positive impact on performances of good leadership style and working climate, we hope to motivate managers to more deeply consider such aspects, which are sometimes disregarded by top executives (Hansen and Wernerfelt, 1989).

Limitations and Hints for Further Research

As any research, our paper comes with its own weaknesses and limitation. First, we point out once again that a single case might have limited generalizability. Nonetheless, given the unique peculiarity of Amgen Italy of making it possible to analyzed polar types of

similarities through the same firm, we believe that the gains in terms of information richness and technique novelty, overcome the downturns of generating less generalizable results. Further, thanks to personal connections with executives, we were able to access to a vast amount of restricted and non-publicly available material, a condition that would be nearly impossible to replicate in a multiple case study setting. Despite between accuracy and generalizability of findings we decided to emphasize the first dimension, this does not imply that our takeaways are not generalizable at all. Indeed, the implementation of the change often did not involve many biotech specific elements, rather it concentrated on aspects such as the organizational structure, culture, resources, human capital, experience, leadership, and managerial cognition that, although with some differences, are present in the large majority of organizations. Furthermore, the biotech sector itself covers a non-trivial role for the world economy and it is constantly growing (Gaisford, 2001).

A second potential point of weakness of this article is the relative small number of interviews collected for the analysis. However, we want to highlight how face-to-face interviews cover only a complementary role in the database, which is enriched by a consistent amount of confidential information, internal presentations, publicly available material, emails, and company reports. Hence, often interviews served as robustness check, to validate insights that we were able to get through the collected material; what is also worthy to evidence is that all interviews are conducted in face-to-face fashion, allowing us to catch also nonverbal signals, such as facial expressions, voice tones, and gesture.

Third, we are aware that studies which consider the cultural dimension, are conditioned by country-specific effects. In other words, since cultural aspects are obviously not the same around the world, our research might unveil findings that are also true for Italian or Mediterranean countries. In our specific case, fortunately, being Amgen Italy a division of

a multinational, implies that several employees had also international experience and the organizational cultural beliefs themselves suffer less of country-related effects if compared to local, privately held organization. Such peculiarity, hence, increases the generalizability level of our findings.

CONCLUSION

This paper, through an original combination of data, unveils the underlying mechanisms that led to the establishment of an ambidextrous climate at Amgen Italy. In particular, the setting of six work streams to address change (leadership and talent management, simplification, delegation, cross-functional cooperation, social engagement, internal communication) revealed to be particularly effective for promoting contextual ambidexterity.

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APPENDIX

Table A. Details on interviewed.

Interviewed	Length (h:mm:ss)
General Manager	1:06:36
Financial Director	0:55:13
Product Specialist 1	0:46:17
HR Manager	0:44:52
District Manager 1	0:26:24
Product Specialist 2	0:27:17
Project Manager 1	0:49:59
Medical Director	1:03:53
Business Unit Director	0:31:39
External Communication Director	0:31:05
Product Manager	0:20:49
District Manager 2	0:20:08
Project Manager 2	0:25:11
TOTAL	8:29:23