

# 1. Introduction

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Mergers and acquisitions (M&A) have been used as instruments for firm growth for many years. Engaging in M&A represents an important commitment for any company as it affects every facet of its organization. The intention of this book is not to discuss every facet of M&A, but to highlight the interaction of M&A with the innovation process. Concurrent with M&A activities, innovation has become increasingly important as a way for companies to achieve and maintain a competitive advantage. The contribution of this book is, therefore, very timely as it integrates two bodies of literature (that of M&A and innovation) which, until now, have remained rather disconnected. These two areas hold important implications for firm level decision making, competitive advantage and growth.

The aim of this introductory chapter is to place this book in the extant literature on M&A, highlighting its originality and specific added value. We also describe the organization of the book by briefly explaining the conceptual framework that has shaped the empirical analysis, and synthesizing the key findings of the study. We leave to the concluding chapter a more thorough discussion of why and how our empirical results extend our understanding of the effects of M&A on innovation. In the final chapter (Chapter 10), we will also illustrate the implications of this study for firms' managers and policy makers, and we will indicate promising avenues for future research on this issue.

## 1.1 THE STATE OF THE ART IN THE ECONOMIC AND MANAGERIAL LITERATURE

With both M&A and innovation a central piece of today's competitive strategy development, it is surprising to find that little research exists on the interrelation between M&A and innovation. Previous work in this domain emphasizes that, at the macro level, technical change is one of the key drivers of the fifth and most recent wave of M&A that occurred during the 90s. At the micro level, it has been shown that the propensity to engage in M&A increases with firms' research and development (R&D) intensity (see

Blonigen and Taylor 2000). In fact, innovation spurs M&A activity as firms pick up assets necessary for the implementation of their innovation strategy and the commercial exploitation of the results of internal R&D. Nevertheless, it is less commonly acknowledged that M&A transactions can have important effects on the innovative potential of firms through the reorganization and integration of businesses.

In particular, empirical studies on the consequences of such operations on companies' technological activities are quite rare. This book aims to fill this gap in the literature. Most existing studies on the effects of M&A are limited to shareholder value or short-run firm performance (see Mueller 1980, Jensen and Ruback 1983, Lubatkin 1983 and 1987, Singh and Montgomery 1987, Seth 1990a and 1990b). More recently, the consequences of M&A for consumer welfare have also been devoted considerable attention (see Caves 1989, Röller et al. 2001, Gugler et al. 2003). The link between M&A and innovation is, despite its importance, less well examined in the literature, at least directly, and views on how technological activities of firms are affected through M&A are often conflicting. Results of tests of which theoretical hypotheses fit the data better are mixed. Large scale statistical studies performed in the 1980s and early 1990s (see Ravenscraft and Scherer 1987, Hall 1990) generally find that M&A have a negative effect on firms' R&D activity. Nevertheless, statistical significance is weak.

While the economic literature typically examines the effects of M&A at a more aggregate level, the management literature tries to dig deeper into the processes governing the impact of M&A on research and development (R&D) and innovation. Studies in this tradition have contended that the effects of M&A are contingent on the type of deal and the characteristics of merging firms. They have shown that it is diversifying M&A that have substantial negative effects on R&D activity and innovation performance (Hitt et al. 1991). The possible reason for this is that after these deals firms replace strategic controls with financial controls, which in turn negatively affects investments with a long-term uncertain pay-off like R&D expenses (Hitt et al. 1996). In addition, the evidence from these studies indicates that in order to have favourable effects on innovation, M&A must meet specific conditions. At least for firms which are involved in M&A for technology sourcing purposes, this occurs when firms have a strong own internal know-how base, when partners are complementary in (technological) know-how but not too dissimilar, and when the M&A integration process is not too complex and is effectively managed, allowing the new firm to retain key people (see Gerpott 1995, Ernst and Vitt 2000, Ahuja and Katila 2001). The major conclusion from the existing empirical studies, however, is that the results are partial and quite difficult to generalize.

In this book we conform to the approach proposed by the management literature in that we aim to provide further insights into the moderating factors that influence the interrelation between M&A and innovation. This has required a concerted effort on three issues:

1. uncovering important and so far neglected conditioning factors for examining the effect of M&A on innovation;
2. constructing finer measures of the effects of M&A on innovation, including measures of changes in R&D inputs, outputs, performance, mission and organization; and
3. developing a database at the appropriate level of disaggregation to pinpoint the effect of an individual M&A on the innovation process.

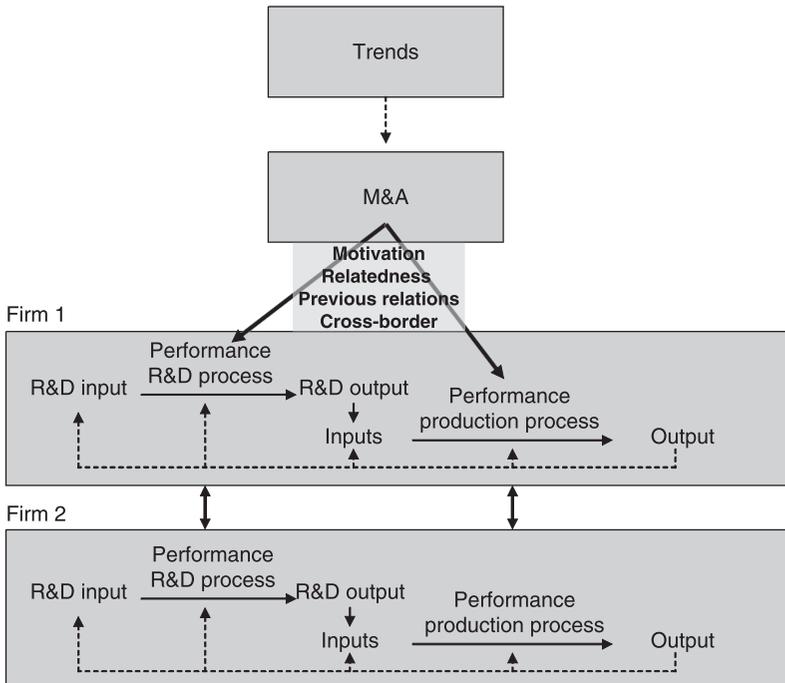
## 1.2 THE ORGANIZATION OF THE BOOK

Figure 1.1 schematically presents the basic structure of the study. M&A have occurred in waves for which environmental trends have an important conditioning effect. Chapters 2 and 3 discuss these trends and the empirical outcomes, showing that many of the M&A in the more recent wave are driven by the deregulation of industries, the strong role of new technologies in the globalization of business, and new financing instruments – as well as a new management orientation to refocus a firm's activity on core business areas.

Whatever the driving trends and motivation for an individual M&A, one should expect it to affect the different processes within an organization. While we will not discuss each possible effect of M&A on the internal workings of an organization, we distinguish between two important processes that any M&A will affect and either directly or indirectly make an impact on the innovation potential of the organization. Chapter 4 surveys the literature, while Chapter 5 formulates the different hypotheses on the effects of M&A on innovation.

First, the M&A will have its impact on the proper R&D process of the company. Obviously, when the M&A has an innovation-related motive, but even when other motives are in play one can hypothesize six different effects on the R&D process of the organization:

1. indivisibilities/specialization due to economies of scale (i.e. spreading fixed costs of R&D over more R&D output);
2. indivisibilities/specialization due to economies of scope (i.e. spreading fixed costs of R&D over different types of R&D output);
3. elimination of common R&D inputs (economies of scale and scope);



Source: Author's elaboration.

Figure 1.1 Direct and indirect impact of M&A on innovation

4. synergies (i.e. combining different knowledge inputs so as to obtain super-additive effects in R&D activities);
5. technology market power and greater appropriation of innovative results; and
6. bureaucracy and internal organization.

For each of these items we carefully specify the hypothesized effects on measures related to the innovation process. Interestingly, we demonstrate that any M&A is *a priori* expected to have conflicting effects on these measures and, hence, not surprisingly, no robust effects have been found in previous large-scale studies.

Secondly, M&A affect production and market-related processes as the integrated company needs to rethink market definitions and production processes. A comparable list of hypotheses relating to the effects of M&A on the output processes is formulated: economies of scale and scope, synergies in inputs, appropriation of returns and market power, and bureaucracy

and internal organization. What intrigues us, however, is that these effects of M&A have indirect non-negligible consequences for the R&D process and should be factored in when deciding on the M&A.

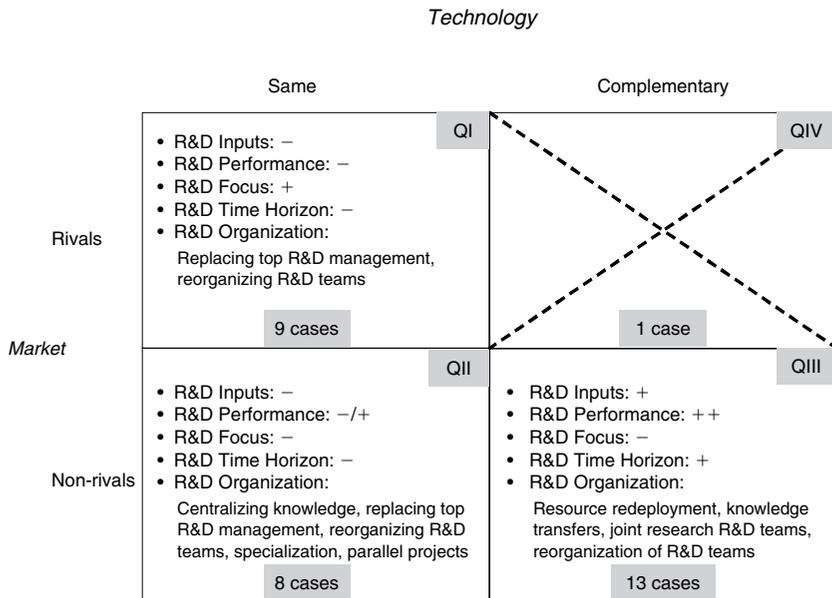
In this book, we argue that to carefully tease out the effects of M&A on innovation, that is both the direct effects on the R&D process and the indirect effects through the production process, we need to classify M&A according to a number of dimensions. In Chapter 6 we outline the key dimensions that emerged from our in-depth study of 31 M&A deals:

- technology relatedness among partners;
- market relatedness among partners;
- motives for M&A (i.e. innovation related or non-innovation related);
- cross-border or national nature of the M&A; and
- the existence of prior collaborative relations among partners.

While we show the importance of understanding these diverse dimensions of M&A for assessing their effects on innovation, the key dimensions we focus on in this book are the firms' *market relatedness*, i.e. whether the firms operate in overlapping geographical and product markets as rivals or not, and their *technology relatedness*, i.e. whether the firms possess similar or complementary technology portfolios. We argue that both technology relatedness and market relatedness distinctly affect the relationship between M&A and innovation and should be accounted for simultaneously. To the best of our knowledge this has not yet been accomplished in the literature.

The impact of M&A between firms active in the same technological fields is expected to lead to a rationalization of the R&D process, while firms active in complementary technological fields are more likely to realize synergies and economies of scope in the R&D process through the M&A. Relatedness on the output market is the other important dimension. M&A activity through the aggregation of markets could lead to economies of scale in output and/or distribution. This will feed back into the innovation process. Similarly, economies of scope in product markets, or product diversification, lead to efficiencies in the R&D process and, hence, indirectly stimulate R&D. In addition, increasing market power in the output market will have a positive effect on R&D performance, but there is no consensus in economic thinking as to whether it will lead to more or less R&D inputs (and outputs).

While technology and market relatedness of partners in M&A might condition the measurable impact of the M&A on the R&D process, we believe that addressing both of these different effects jointly constitutes an important conceptual contribution of our study. Therefore, as indicated in



*Note:* Positive effect = +; negative effect = –.

*Source:* Author's elaboration.

*Figure 1.2 Market and technology relatedness*

Figure 1.2, we classify the different M&A according to their market and technology relatedness and compare the effects of the M&A on the innovation process across these different cases. To measure the conditioning effect of market relatedness on the effect of M&A on innovation we compare the effects of M&A that combine *rival* firms with an overlapping technology portfolio (quadrant I) with M&A classified as between *non-rival* firms with an overlapping technology portfolio (quadrant II). Next, we contrast the effects of M&A in quadrant II with M&A that occur between non-rival firms with *complementary* technology portfolios (quadrant III) to analyse the pure effect of technology relatedness. As expected, we only found one unlikely case of M&A claiming to be between rival firms but with complementary technology portfolios (quadrant IV).

When turning to alternative dimensions for understanding the effect of M&A on innovation, the motives of the M&A might reveal the priorities of management with respect to innovation. Non-innovation related motives are more likely to hurt the firms' innovation performance through the restructuring effort and R&D cutting, while M&A with innovation

related motives are more often oriented to leveraging the R&D process. Greater physical and cultural distance between partners in cross-border M&A implies that they are harder to deal with, and the integration of knowledge and technology would proceed more slowly as, in many cases, the transfer of knowledge and technology is more difficult. On the contrary, pre-M&A collaborative relations reduce information asymmetries between M&A partners, increase trust and mutual understanding, and allow the firms to better exploit existing knowledge and capabilities.

Before we could start detailing any results, we needed to identify a richer set of factors that explained why and, more importantly, how innovation was affected by M&A. Therefore, a second important contribution of our study was the development of a broad set of measures of innovation and innovation organization for assessing the impact of M&A on innovation. First, the effects on R&D inputs should be disentangled from the effects on R&D outputs and efficiency. Next, and probably more interestingly, not only the impact on R&D inputs, outputs and efficiency needs to be considered but also the impact on the nature of R&D activities (short-term versus long-term, make versus buy, basic versus applied, incremental versus drastic) and the organization of the innovation process (centralization versus decentralization, resource deployment, team re-organization, etc.). For generating some novel and more fine-grained measures, we developed a questionnaire with more than 50 questions related to the possible effects on R&D and the innovation process.

A final but crucial contribution of our empirical study is methodological in nature. As the literature survey pointed out, the existing evidence on the effects of M&A on innovation is mixed and quite inconclusive. In our view, one of the key reasons is that previous empirical works suffer from serious methodological weaknesses.

- The data used in these studies to analyse these effects are mostly standardized large sample public data such as R&D expenditures, patent counts, and productivity. These data might reveal to what extent M&A have an impact on innovation but do not tell us how.
- Even when studies rely on a longitudinal analysis of yearly data, these data are aggregated at the firm level and are unsuitable to highlight the impact of a single M&A on innovation. Actually, a firm often engages in more than one acquisition per year (sometimes more than ten). Even when a firm performs only one M&A in a given year, it may acquire only a portion of the target company or, after the deal, part of the acquired assets may be divested. This makes it impossible to compare the pre and post-deal situations of the combining firms, if one only relies on firm-level yearly data.

- A long time period may elapse before the effects of an individual M&A become apparent in firm-level R&D input and especially output data. In addition, these data may be influenced by several other factors which are very difficult to control.

To deal with these weaknesses, we relied on case studies of individual M&A. The case study design we follow was based on interviews with firms' top managers who were involved in the deal, and is uniquely suited to uncover the channels through which an individual M&A has an impact on the innovation activity of the two combining units, and allowed us to develop new insights into the detailed dynamic mechanisms linking M&A and innovation. Such insights from case study research is particularly appropriate when little is known about a phenomenon, or when current perspectives seem inadequate because they have little empirical substantiation. The latter point is particularly the case for the linkage between M&A and innovation.

Furthermore, through the use of the above-mentioned questionnaire, the case studies were also instrumental in gathering a large amount of data of both a perceptual and substantive nature that were codified in a standardized format suitable to statistical analysis. Chapter 7 describes the new EU dataset, which was collected by directly interviewing high ranking managers such as the Chief Executive Officer (CEO), Chief Finance Officer (CFO) or vice presidents for R&D and strategy of high and medium tech firms that had been involved in M&A. Although the sample is rather small – 31 M&A and 62 companies – the data obtained provides in-depth information for each individual deal. In particular, we have collected not only traditional R&D indicators such as R&D expenditures, R&D personnel and patent counts, but also in-depth measures capturing aspects such as changes in R&D portfolios and time horizon, and the degree of R&D reorganization. Wherever possible this data was cross-checked with published documents such as annual reports, press releases, newspaper articles and industry publications. As a result of these in-depth measures, we can study not only to what extent M&A have an impact on R&D but also how, by scrutinizing the dynamic reorganization processes of the firms involved in a given deal. Nevertheless, some caution is needed when interpreting our results as they are derived from survey data with a limited sample size.

Our results on the conditioning effect of market and technology relatedness are illustrated in Chapter 8 and are summarized in Figure 1.2. First, when merged entities are technologically complementary (quadrant III), they become more active R&D performers after the M&A. In sharp contrast, when merged entities are technologically substitutive (quadrant II), they significantly decrease their R&D level after the M&A. Secondly, if we

focus on the cases in which merged entities are technologically substitutive (quadrant I versus quadrant II), the reduction of R&D output is more prominent and the R&D efficiency gain is smaller if merged entities were rivals in the product market prior to their merger than if they were non-rival. This suggests that M&A between rival firms do tend to have a rather negative impact on the new entity's innovation process. We also dig into the sources from which changes in R&D activities originate. We find that when merged firms are technologically substitutive, rationalization of their R&D activities often leads to organizational turmoil and demoralization of personnel with key employees leaving the firm. In addition, the R&D portfolio becomes more focused, the R&D horizon becomes shorter, and internal funds available to R&D decrease.

With respect to other dimensions of the M&A, our results (discussed in depth in Chapter 8) confirm that M&A with innovation-related motives result in increased R&D inputs and outputs. Cross-border M&A face more obstacles for R&D resource deployment, while the existence of prior collaborative relations between merging firms increase R&D output and performance through a better exploitation of technological competencies. Of course, the information collected during the case studies is only partially synthesized in the statistical analysis. Therefore, our study reports (in Chapter 9) a narrative of four individual cases, all situated within the chemical and pharmaceutical sector. These cases provide texture to the statistical analysis of the preceding chapters and introduce some specificities about the relationship between M&A and innovation that were not captured in the broader analysis and relate more of the managerial aspects of the M&A and the impact on the innovation process.

The acquisition of Novamax by Henkel was driven by competitive motives – to avoid the competition running off with the acquired company. As the companies had similar technological strengths and an important overlap in their key markets, the impact of the M&A on the R&D inputs was quite negative – with the cutting of many projects and the reduction of head count. The case, however, illustrates that the carefully structured integration process did lead to a positive effect on the performance of the innovation process, most particularly through the incorporation of the more output-oriented business culture of the target company. Henkel tended to have a very technical and risk averse sales process, which delayed new products to market. Novamax, through high-powered incentives for its sales force, ran a more market-based sales strategy feeding back to the R&D process, with a resulting fast time to market. The latter approach was adopted for the new entity after the M&A, leading to a more agile sales force driving positive results for the post M&A firm in innovation.

In the M&A between Solvay and BASF, the companies decided to pool

their vinyl businesses. While we would predict a rather negative outcome of this deal for innovation based on firms' similar technology portfolios, Solvin (the new company), performed outstandingly as management took measures countering the possible negative consequences of the M&A on innovation. Most importantly, the business was run as a separate joint venture, improving the focus of management and researchers on the vinyl business. This was an important departure from the negligible importance attributed to these businesses in the original mother companies.

The acquisition of Gist-brocades by DSM happened after the companies formed a 50:50 joint venture in the past. This prior relationship positively affected the outcome of this M&A between non-rivals with complementary technology portfolios. A comparable story is told in the merger between Pharmacia & Upjohn and Monsanto. Here, two companies operating in different markets and with complementary technologies joined forces and improved the performance of their innovation process considerably.

We believe that this study assembles the most current information on the relationship between M&A and innovation, both from the economics and the management perspectives. More importantly, it advances the discussion by highlighting (some of) the key moderating factors which influence the effects of M&A on innovation. Among them the market and technology relatedness between M&A partners figure prominently. While this cannot be considered the definitive study on the issue, due to the qualitative nature of our data and the small sample of cases at our disposition, we nevertheless believe that it provides a good starting point for future studies on the subject. The concluding chapter of this book, while summarizing the key results of our study and the additional value they contribute to the extant literature, illustrates their implications for firms' managers and policy makers, and suggest some promising avenues for future research in this field.