



Management Research Review

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Article information:

To cite this document:

Luca Dezi, Enrico Battisti, Alberto Ferraris, Armando Papa, (2018) "The link between mergers and acquisitions and innovation: A systematic literature review", Management Research Review, <https://doi.org/10.1108/MRR-07-2017-0213>

Permanent link to this document:

<https://doi.org/10.1108/MRR-07-2017-0213>

Downloaded on: 20 March 2018, At: 22:17 (PT)

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The link between mergers and acquisitions and innovation

A systematic literature review

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Mergers and
acquisitions
and innovation

Received 14 July 2017
Revised 14 November 2017
26 January 2018
Accepted 5 February 2018

Abstract

Purpose – The link between mergers and acquisitions (M&A) and innovation has been analysed in both corporate finance studies and the innovation literature. Despite this attention and the practical evidence that highlights different connections between these two terms, there is a need to investigate the latest trends with regard to these important topics, and to put a particular focus on the emerging paradigm of open innovation. Thus, this paper aims to provide a systematic literature review (SLR) about the relationship between M&As and the concept of innovation in the current scenario.

Design/methodology/approach – Through an SLR from 2012 to June 2017, 55 papers have been identified and analysed to give a better understanding of the motivations and the methodologies adopted in past studies.

Findings – This paper identifies various conceptual and research methodological characteristics of studies that have connected, directly or indirectly, M&As and innovation in recent years. In addition, the results highlight a scarcity of studies that explicitly or implicitly refer to the open innovation paradigm, marking only a partial understanding of this emerging phenomenon.

Originality/value – This paper improves the knowledge on the link between extraordinary corporate transactions and innovation, and it highlights that a clear consensus, particularly regarding the open innovation paradigm, is lacking. Thus the authors propose that future studies should carefully evaluate M&As by following the open innovation approach.

Keywords Literature review, Innovation, Intellectual capital, Open innovation, Other management-related topics, Corporate finance, M&As, Structured literature review, Mergers and acquisitions

Paper type Literature review

Introduction

In the past 10 years, the phenomenon of mergers and acquisitions (M&As), which has played an important role in companies' growth and competitiveness, has constantly grown



(Bresciani, 2012). In particular, researchers, managers and bankers have studied it thoroughly. M&A operations are the most important way to grow a company's capacity to create value (Bower, 2001; Cartwright and Schoenberg, 2006), with the aim of finding the optimal size to compete in the most important markets for the firm, where the maturity of the industry makes competition harder. The "time factor" and the difficulty of obtaining "market share" are the most important causes of M&A, which are usually preferred to internal development (Conca, 2010).

Economic, financial and legal factors have also influenced the spread of M&As, generating the so-called "waves" (DePamphilis, 2010). Nowadays, M&As are not extraordinary events but are real strategic options for companies in their development paths (Tardivo *et al.*, 2012; Brealey *et al.*, 2015). However, M&A activities have a high failure risk, and in some cases, the returns on the investment are lower than the price paid to acquire the firm (Conca, 2010; Brooks *et al.*, 2015).

In the current state of the global market, where hyper-competitiveness is the main characteristic that companies have to face, competitive advantages and the ability to apply innovation in products and services play a key role in obtaining higher earnings and future survival (Maggioni and Del Giudice, 2011; Bresciani *et al.*, 2016; Ferraris *et al.*, 2017a). Innovation is the practical application of an invention or a discovery to a process, product or service that ensures better results for the company, having a good impact on its competitiveness and long-term success (Santoro *et al.*, 2016). In particular, among all the strategic innovation development options, both internal and external to the firm's boundaries, M&A are often the most effective response to the need to integrate innovative elements quickly into a business model, particularly in a dynamic context such as the current one (Dallocchio *et al.*, 2016).

In this regard, in recent decades an emerging field of research has pointed the attention on the concept of open innovation:

Is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology. Open Innovation combines internal and external ideas into architectures and systems whose requirements are defined by a business model (Chesbrough, 2003).

This paradigm argued that firms' innovation processes should be open, allowing knowledge to flow within and across their boundaries (Chesbrough, 2003; Messeni Petruzzelli *et al.*, 2009; Del Giudice and Della Peruta, 2013).

In fact, the changes in the economy caused by globalization make it necessary to rethink the traditional concept of innovation. In this context, the convergence of sectors has required the concept of "innovation" to be upgraded from the former understanding. The pioneer of the principles of open innovation is Chesbrough, who in 2003, in "The era of open innovation", explained the changes to the traditional model of innovation and the transition from closed to open innovation that led to the beginning of research on innovation across the borders of a company (Chesbrough, 2003). In particular, with the proliferation of research on open innovation in corporate R&D activities, the relationship between M&A activity and (open) innovation has lately received attention. One recent exception is the work of Miglietta *et al.* (2017) that have highlighted how some listed companies, called "Dividend Champions", have adopted, among the various practices of open innovation, also the use of M&A to acquire technology-intensive firms. From this point of view, M&As can also be understood as a form/method of inbound OI, i.e. practices that allow the draw and rely on external skills, knowledge and competences (Michelino *et al.*, 2014a; Lee *et al.*, 2015).

As a result of the emergence of this topic in the literature, it has become of interest to understand whether there has been a parallel development of research in the field of M&A. Thus, the main objective of this paper is to describe the state of the art in academic studies on this topic, focusing in particular on the possibility to reconcile the relationship between M&A and open innovation as a strategic tool to boost innovation activities. We therefore aim to answer the following research questions:

- RQ1.* Which are the main studies and research articles in the literature that links M&A and innovation?
- RQ2.* Has the new paradigm of open innovation been extensively connected to M&A activity?

In this paper, 55 publications were selected and analysed through a systematic literature review (SLR) to answer our research questions. Our findings suggest that the link between innovation and M&A is quite well established in the literature. However, they also show that there is a scarcity of studies that refer explicitly to the open innovation paradigm. Only five of the papers analysed addressed these relationship explicitly, and only two did so implicitly. Thus, the connection between M&A and the new paradigm of open innovation is still generally neglected. Our contribution is to analyse the main characteristics of recent studies on this topic and, at the same time, to propose future research that focus more on the link between M&A and open innovation.

The remainder of the paper is structured as follows. First, the theoretical background introduces the concept of M&A and its relationships with innovation. The research method and the systematic literature review (SLR) are then presented, and this is followed by a discussion of the results of the study. Finally, the paper provides some conclusions and possible directions for future research.

Theoretical background

Mergers and acquisitions

Mergers and acquisitions are common strategies used by firms to augment their performance. Even though the motives for M&A may be similar, the determinants are discreet (Kumar Sahu and Agarwal, 2017). There are many approaches towards studying M&A activities, and these studies have involved a large number of researchers and scholars from different countries (DePamphilis, 2017). However, it is possible to identify two principal streams of study, the so-called “economic studies/approaches” and the “corporate/management studies/approaches” (Capasso and Meglio, 2010; Tardivo *et al.*, 2012).

First, the “economic studies/approaches” analyse the effects that M&A activities have on the entire economic system, and we can distinguish between “industrial organization” studies and “financial economics” studies: while the former investigate the consequences of M&A on the economic system, the latter focus on shareholders (Tardivo *et al.*, 2012). “Industrial organization” is based on the archetype of structure–conduct–performance, in which the structure of the firm influences its behaviour and therefore its performance (Brito and Catalao Lopes, 2006). “Financial economics” considers the effects of M&A transactions from a financial point of view. These studies use the “event studies” technique (MacKinlay, 1997), which is a statistical method that is able to evaluate the impact of an event on the value of a firm (McWilliams and Siegel, 1997).

Second, the “corporate/management studies/approaches” can be divided into two main approaches: “strategic management” and “organizational behaviour” (Cartwright and Schoenberg, 2006; Tsoukas and Knudsen, 2002).

On the one side, the focus of the “strategic management” research in the M&A field has been on the identification of strategic and process factors that may explain the performance variance between individual acquisitions (Cartwright and Schoenberg, 2006). In particular, Tsoukas and Knudsen (2002) classified studies of a strategic nature according to their prevailing approach, distinguishing between the “variance approach” and the “process approach”. The “variance approach” studies the connection between an explanatory variance and a predictive variance that describe the analysed event. Meanwhile, the “process approach” focuses on the deal process and on the mechanisms and processes that generate a phenomenon (Jemison and Sitkin, 1986).

On the other side, “organizational behaviour” is the study of human behaviour in organizational settings, the interface between human behaviour and an organization, and the organization itself. According to this approach, acquisitions involve both individual and organizational consequences, based on the concept that it is the quality of the acquisition process that determines whether the outcome of the transaction is successful (Capasso and Meglio, 2010). In this line of analysis, studies that have related post-acquisition issues to different organizational cultures have contributed to an understanding of the difficulties and failures of certain operations and, consequently, the importance of corporate culture in acquisition processes (Weber and Schweiger, 1992; Cartwright and Cooper, 1993, 2014; Weber, 1996).

One of the most important contributions on the subject of M&A from a strategic point of view is the paper by Bower (2001); the author, using a “resource–process–value” approach, highlights different types of M&A and their strategic objectives:

- *The Overcapacity M&A*: This strategy is adopted when there is overcapacity in a mature sector with intensive capital, and the objective is to remove the excess productivity.
- *The Geographic Roll-up M&A*: This strategy aims to integrate two competitors in a fragmented sector.
- *The Product and Market Extension M&A*: In this type of operation, the objective is to extend the range of a company’s products or its geographical borders.
- *The M&A as R&D*: In the high-technological sector, bigger companies tend to acquire the smallest ones or “start-ups”, to improve their knowledge and internal processes.
- *The Industry Convergence M&A*: This type of M&A is used to take advantage of the opportunities in convergent technological sectors, where the borders are eroding.

Furthermore, which indirectly fits with the view of the “corporate/management studies/approaches”, during the past 30 years the role of intellectual capital in M&A has significantly increased, because intangible assets are one of the most important reasons for targeting a firm and intellectual capital is a crucial asset for a firm’s success (Gupta and Roos, 2001). Studies concerning intellectual capital in M&A have become more usual since the 1990s, but the literature is still missing a common language on these topics, and there is no consistency in the definition of this theme (Bou-Wen *et al.*, 2006; Schiesari *et al.*, 2016). Stewart (1997) explains that “intellectual capital is the sum of everything that everybody in a company knows that gives it a competitive advantage”. Referring to these aspects, competitive advantage is the key factor in beating the competition, and innovation is the engine for obtaining that advantage in the future.

However, the success of M&A mainly depends on how buyers manage their intangible capital (non-material assets) over time, and intellectual capital has to be the basis for high-

value synergies. From this point of view, a recent study conducted by Mercer (2016) highlights that in M&A, 35 per cent of buyers fail to exercise any assessment of policy expertise, and the post-M&A risks connected with human resources are growing.

Mergers and acquisitions and innovation

The growth of a firm is indicated by scholars, experts and policymakers as one of the main strategic levers for enhancing innovative capacity and sustaining a competitive advantage. Often, the acquisition of another firm is quickest and most effective strategy for firm growth (Ahuja and Katila, 2001). This operation can bring several advantages, including a better propensity for innovation in terms of both process and product (Adner and Levinthal, 2001). For process innovation, an acquisition can help to achieve economies of scale and scope by reducing the average cost of production and creating synergies between complementary assets (Singh and Montgomery, 1987). For product and service innovations, an acquisition can foster new organizational models and make access to the research and innovation capacity of other firms easier, improving the firm's knowledge base and allowing it to access new technologies that lead to a faster introduction to the market (Ferraris *et al.*, 2017b). As previously observed, according to Bower (2001), acquisitions occur for five reasons: to deal with overcapacity through consolidation in a mature industry; to roll up competitors in geographically fragmented industries; to extend into new products or markets; as a substitute for R&D; and to exploit industry boundaries by inventing an industry. The last three of these reasons highlight that the acquisition of another firm is a strategic tool to accelerate innovation by giving access to new products and acquiring resources, technologies and knowledge (Shuen *et al.*, 2014). More particularly, obtaining technological know-how and developing technical capabilities are increasingly important motives in acquisitions (Shin *et al.*, 2017).

The relationship between innovation and M&A has received attention from both practice and academia (Dodgson *et al.*, 2014). However, evidence on the relationships between extraordinary corporate transactions and innovations is controversial. Generally, the current studies show that M&A can increase the level of innovation, and that a high level of innovation before a merger or acquisition can increase the probability that a company will participate in a merger or acquisition (Xiaojie and Tingting, 2017). In particular, some scholars provide evidence that an acquisition has a positive effect on a firm's innovativeness. For example, the acquisition of a firm is viewed as the absorption of the acquired firm's knowledge base (Ahuja and Katila, 2001). Furthermore, such a process can expand the acquirer's knowledge base and increase its innovation output by providing economies of scale and scope in research and by enhancing the acquirer's potential for inventive recombination (Fleming, 2001; Bresciani and Ferraris, 2016). Conversely, other scholars suggest that acquisition can have negative effects on a firm's innovativeness. Specifically, acquisition involves managerial issues, integration problems and transaction costs (Zollo and Singh, 2004; Del Giudice and Maggioni, 2014; Carayannis *et al.*, 2017). Some researchers, such as Ahuja and Katila (2001), have found that technological acquisitions enhance innovation performance, while non-technological acquisitions do not have a significant effect on subsequent innovation output. Certainly, the success of an acquisition depends on not only the complementarities of the firms but also the approach to innovation and on the firms' cultures (Conca, 2010).

In general, innovation within a firm is traditionally driven by internal activities and capabilities (Cohen and Levinthal, 1990) and by external factors and pressures of the market (Arora *et al.*, 2001).

Success and competitive advantage depends on the ability of a company to integrate, build and reconfigure its internal and external resources to address rapidly changing environments (Cohen and Levinthal, 1990; Chesbrough, 2003). In fact, the innovation literature agrees that product and process innovation performance increase with a larger internal knowledge base (Chesbrough, 2003). For this reason, external knowledge can be seen as a complement to the internal knowledge (Chesbrough and Crowther, 2006).

M&A and innovation: relevance of open innovation

In the past decade, the open innovation paradigm has extensively examined the advantages and the challenges of opening up corporate boundaries in order to boost firms' innovation processes (Chesbrough, 2003, 2006; West and Bogers, 2017). In this regard, three core open innovation processes have been outlined (Gassmann and Enkel, 2004):

- (1) The outside-in process, which allows the firm to source knowledge from outside through the integration of suppliers and customers, who in turn increase the company's innovativeness.
- (2) The inside-out process, which allows the firm to externalize and exploit its internal knowledge in different markets, selling IP and multiplying technology by channelling ideas to the external environment.
- (3) The coupled process that allows a firm to perform both activities through alliances and strong integration between different firms.

Firms may not have the resources or the need to adopt the same core open innovation processes simultaneously or to integrate all three processes to the same degree (Gassmann and Enkel, 2004; Del Giudice *et al.*, 2011). However, all these three processes can be related to M&A operations, because firms can decide to acquire and internalize other companies to reach the same objectives in terms of innovation (Berchicci, 2013).

The pioneer of the study of open innovation is H. Chesbrough that presented the main building concepts in his seminal work "Open Innovation: The new Imperative for Creating and Profiting from Technology". (Chesbrough, 2003). For Chesbrough (2006), open innovation is:

The use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology.

In addition, practical studies have been performed, such as the case study on Procter & Gamble (Dodgson *et al.*, 2006); the aim here was to understand the major organizational and technological changes associated with open innovation. A case study about Nokia was carried out by Dittrich and Duysters (2007), investigating how innovation networks can be used to deal with a changing technological environment. These studies focus only on the concept of open innovation and do not have a clear connection with M&A, as affirmed by Oberg (2017):

There is a relatively limited amount of research concerning itself with open innovation and acquisitions combined. Furthermore, acquisitions are for the most part seen as a means to reach innovation in transaction-based transfers between parties.

Moreover, the acquisition of knowledge and intangible resources (intellectual capital) frequently underlies M&A strategies (Gupta and Roos, 2001). Intellectual capital can be defined "as a unique bundle of intangible assets that are the basis of sustainable competitive

advantage” (Anderson, 2004) and clear relationship between intellectual capital and innovation has been suggested (Chen *et al.*, 2015). In particular, from the point of view of intellectual capital, open innovation may affect the relational capital (Užienė, 2015; Giacosa *et al.*, 2017), that is one of the key factor of organizational innovation (Michelino *et al.*, 2014b).

Research method

This paper draws particularly on theoretical evidence published in academic journals about M&A and the relationship between M&As and innovation, through an SLR, which is a method of locating, appraising and synthesizing evidence (Petticrew, 2001; Tranfield *et al.*, 2003; Pittaway *et al.*, 2004).

An SLR was used because this method allowed the sample of publications to be examined in a systematic way. The use of the SLR method was guided by the desire to improve the knowledge on the analysed topics in the academic field. The importance of this research method is that it becomes possible to increase the knowledge already present in the literature and so to achieve a good in-depth study, through a careful, formalized and replicable research pattern (Tranfield *et al.*, 2003; Booth *et al.*, 2012; Hou and Neely, 2013).

This investigation policy has been used in the social sciences and in the managerial field by various authors (David and Han, 2004; Thorpe *et al.*, 2005; Colicchia and Strozzi, 2012).

The five successive stages of analysis that characterize the SLR method are summarized in the following phases; these phases correspond to the different moments of inquiry in each stage of research (Thorpe *et al.*, 2005).

The five phases of an SLR:

- (1) *Phase 1*: Definition of search and selection key in the database.
- (2) *Phase 2*: Search of articles (papers) in the database.
- (3) *Phase 3*: Reading and selection of titles and abstracts.
- (4) *Phase 4*: Reading and selection of articles (papers).
- (5) *Phase 5*: Analysis of articles (papers) for the purpose of research.
(Source: Thorpe *et al.*, 2005)

In particular, Table I shows the SLR phases of our research.

Further, 55 papers were identified that were published between 2012 and June 2017, to give an understanding about the most recent publications on the subject of “M&A and innovation”. The review included academic journal articles that could be downloaded from Google Scholar. The Google Scholar database is a freely accessible Web search engine that

Phase for research	Details
Selection of document types	Academic journals
Selection of databases	Google Scholar
Keywords	Search of specific research keys in the title and abstract of the article: “M&A and Innovation”, “M&A and Intellectual Capital”
Categories for research	Journals Year of publication Research design and methods
Outcomes	Selection of 55 papers from 2012 to 2017 (June) Identification of M&A and open innovations relationships Recognition of research gaps Identification of theoretical implications

Table I.
Systematic literature
review process of our
research

indexes the full text of scholarly literature across an array of publishing formats and disciplines.

Two main keywords were used to find the articles, looking specifically at the title and the abstract of each paper: “M&A and Innovation” and “M&A and Intellectual Capital”. The choice of these two keywords is linked to the will of the authors to select, in this preliminary study, two fundamental elements related to extraordinary operations, namely innovation and intellectual capital. This gave us a clear idea of the state of academic study on the topic of this systematic review over the past five years. In particular, M&As can be conceived as mechanisms to achieve many distinct goals in the field of innovation (Dodgson *et al.*, 2014) and “intellectual capital” component usually has a key role in the innovation concept (Calza *et al.*, 2014; Giacosa *et al.*, 2017).

The following information was extracted for each article: academic journals, year of publication (to assess the presence of open innovation articles for each year) and, finally, the research design and method used. The focus during the research was to obtain a systematic view of the spread of studies in the last five years, and the presence of research on M&A and open innovation in academic publications. Each article was analysed to identify the methodology of its study, to underline the trends in extraordinary corporate transactions and innovation research in recent studies. The articles followed three main methodologies (Baccarani and Bonfanti, 2016):

- (1) desk qualitative research (literature/theoretical paper);
- (2) empirical quantitative research (survey); and
- (3) empirical qualitative research (case study/multiple case study).

Each paper was also examined with the aim of finding the research gaps in the current literature, with a particular focus on M&A and open innovation.

Results

This section sets out a summary of the SLR. Specifically, it presents and discusses the results in relation to the academic journals, the topics, the research designs and the methods used. Moreover, our objective was to identify research gaps in the current literature and to provide future research directions. In [Appendix](#), it is possible to find some specific details about each article in the literature review, such as the year of publication, the names of the authors, the methodological approach and the main concepts proposed in the abstract. In [Table II](#), the journals that address the topic of this research are presented, along with those in which the topic is found most often, because the first step was to identify the journals in which the papers are published. In total, 43 different journals have been found to address this topic.

The split allows us to understand whether some journals have published more on “M&A and innovation” than others. As shown in [Table II](#), the journal with the largest number of publications is the *Strategic Management Journal*, which has four papers. *Research Policy* and *Science and Technology Management Research* have three papers each. *Management Research: Journal of the Iberoamerican Academy of Management*, *International Business Review*, *Journal of Management & Organization*, *The International Journal of Human Resource Management* and *Group & Organization Management* have two papers each. The other 35 journals have only one paper each. See [Table III](#).

It is important to underline that this research used only two key terms to select the analysed papers: the generic “M&A and Innovation” and “M&A and Intellectual Capital”.

Mergers and
acquisitions
and innovation

Serial No.	Name of journal	No. of papers	(%) of papers
1	<i>Strategic Management Journal</i>	4	7.27
2	<i>Research Policy</i>	3	5.45
3	<i>Science and Technology Management Research</i>	3	5.45
4	<i>Group & Organization Management</i>	2	3.64
5	<i>Management Research: Journal of the Iberoamerican Academy of Management</i>	2	3.64
6	<i>International Business Review</i>	2	3.64
7	<i>Journal of Management & Organization</i>	2	3.64
8	<i>The International Journal of Human Resource Management</i>	2	3.64
9	<i>Small Business Economics</i>	1	1.82
10	<i>Industry and Innovation</i>	1	1.82
11	<i>Journal of Health Care Law & Policy</i>	1	1.82
12	<i>International Journal of Technology Management</i>	1	1.82
13	<i>Journal of Marketing Research</i>	1	1.82
14	<i>Management Decision</i>	1	1.82
15	<i>Technology Analysis & Strategic Management</i>	1	1.82
16	<i>Asian Journal of Technology Innovation</i>	1	1.82
17	<i>Long Range Planning</i>	1	1.82
18	<i>Growth and Change</i>	1	1.82
19	<i>Strategic Direction</i>	1	1.82
20	<i>European Journal of Futures Research</i>	1	1.82
21	<i>Journal of Management</i>	1	1.82
22	<i>Journal of Innovation Management</i>	1	1.82
23	<i>Journal of Product Innovation Management</i>	1	1.82
24	<i>Empirical Economics</i>	1	1.82
25	<i>Journal of International Trade</i>	1	1.82
26	<i>European Journal of Information Systems</i>	1	1.82
27	<i>Scholedge International Journal of Management & Development</i>	1	1.82
28	<i>International Research Journal of Business and Management</i>	1	1.82
29	<i>Journal of Corporate Finance</i>	1	1.82
30	<i>The Journal of Finance</i>	1	1.82
31	<i>Journal of Knowledge Management</i>	1	1.82
32	<i>Journal of Engineering and Technology Management</i>	1	1.82
33	<i>Decision Sciences</i>	1	1.82
34	<i>Journal of Business and Management</i>	1	1.82
35	<i>Economics of Innovation and New Technology</i>	1	1.82
36	<i>South China Journal of Economics</i>	1	1.82
37	<i>Global Journal of Business Research</i>	1	1.82
38	<i>California Management Review</i>	1	1.82
39	<i>Industrial and Corporate Change</i>	1	1.82
40	<i>Journal of Accounting, Business & Management</i>	1	1.82
41	<i>The Journal of Technology Transfer</i>	1	1.82
42	<i>Review of Financial Studies</i>	1	1.82
43	<i>Procedia – Social and Behavioral Sciences</i>	1	1.82
		55	100.00

Table II.
Journals analysed

Years	2012	2013	2014	2015	2016	January-June 2017
Number of papers	6	8	10	10	12	9
Papers that explicitly refer to M&A and open innovation	0	0	1	1	0	3
Papers that implicitly refer to M&A and open innovation	1	0	0	0	1	0

Table III.
Publication date

MRR

The papers that were identified by the latter key term numbered 20, while the others (35 out of 55) all referred to the “M&A and Innovation” research domain.

In [Table III](#) (as well as in [Appendix](#)), information about the distribution of publications over the period of time considered in this research is presented. A period of five years was selected so that we could obtain precise data on what researchers have been focusing on in recent years, relatively close to today. In particular, in [Table IV](#), each year was analysed to find the papers published in that year, and then we underline how many studies have evaluated not only innovation in general but the more precise concept of “open innovation” in relation to M&A studies. We considered this in two different ways: explicitly and implicitly.

- For 2012, there were 6 papers, one of which implicitly studied open innovation and M&A – the paper entitled “Open innovation management: Challenges and prospects” (paper 55).
- For 2013, 8 papers were analysed but we found no evidence of study of the open innovation and M&A phenomenon.
- For 2014, 10 papers were found, one of them explicitly studying open innovation and M&A: “A comparative perspective on external technology sourcing modalities: The role of synergies” (paper 35).
- For 2015, 10 papers were discovered, and one of them explicitly analysed M&A and open innovation: “Open innovation: A new classification and its impact on firm performance in innovative SMEs” (paper 22).
- For 2016, 12 papers were investigated, one of them implicitly studying open innovation and M&A: “Make, buy, or both: The innovation sourcing strategy dilemma after M&A” (paper 14).
- For the period up to June 2017, 9 papers were found, and 3 of these explicitly related to M&A and open innovation: “Open innovation and intellectual property. A knowledge-based approach” (paper 6), “Entrepreneurial acquisitions, open innovation and UK high growth SMEs” (paper 2) and “Reconfiguring the firm’s core technological portfolio through open innovation: Focusing on technological M&A” (paper 1).

Overall, only 5 papers out of the total of 55 analysed (9.09per cent) explicitly addressed the open innovation paradigm and M&A, and only two out of the total (3.63per cent) implicitly addressed it.

This shows that open innovation and M&A were and are studied together, but not as much as innovation.

The aim of the last part of our research was to understand the research design of each paper. As [Table IV](#) shows, an empirical quantitative method was used most often, with 40 papers having this type of research design. The empirical qualitative method

Research design	No. of papers	(%)
Empirical quantitative research	40	72.73
Desk qualitative research	6	10.91
Empirical qualitative research	9	16.36
Total research design	55	100

Table IV.
Research designs

(case study/multiple case study) was used nine times and the desk qualitative method was least used, with six papers following this method.

In [Appendix](#), the methodological approach for each paper is shown, together with the abstracts, which allows the reader to understand the papers and the processes that were used to write them.

From our analysis it is clear that “M&A and innovation” is a current and quite a “hot” topic, and that many scholars are carrying out research in this area, mainly to evaluate the positive impact that M&As can have on the innovation outcomes of companies.

In particular, the papers that explicitly analysed the connections between M&A and open innovation have highlighted the following aspects. Paper number 35 highlights the fact that “Integrating different external sourcing modes is more effective than specializing in a single mode, especially when the specialization is focused on M&As” ([Sabidussi et al., 2014](#)). Paper number 22 studied open innovation in the context of SMEs, and the authors affirmed that “M&A/alliance may aim to acquire external technology, but this kind of open innovation involves greater changes in a firm’s organisational structure” ([Ahn et al., 2015](#)). Another paper on this is paper number 1. The purpose of that study was to investigate the effects of open innovation, focusing on technological M&A, and the changes in a firm’s technological portfolio. The authors highlighted that “Technological M&As provide a suitable setting to examine how utilizing open innovation affects the reconfiguration of the firm’s core technological portfolio” ([Shin et al., 2017](#)). Paper number 6 analysed how previous and present innovation practices are connected to knowledge management strategies and the form of innovation output. The authors explained that:

Four open innovation practices were considered: outsourcing of R&D activities, R&D collaboration, purchase of external technology and incorporation of knowledge through M&As”, and concluded that “the higher the share of previous internal development, the lower the odds to further adopt open innovation in all forms but M&As. [...] Actually, the purchase of technology is the only open activity in which third parties do not enter in direct contact with the technological knowledge of the acquirer ([Cammarano et al., 2017](#)).

Paper number 2 observed the dynamics of acquisitions undertaken by UK high growth SMEs; the authors showed that “acquisition can therefore be conceptualised as an advanced stage of the outside-in “open innovation” strategies proactively used within these innovative SMEs” ([Mawson and Brown, 2017](#)).

Lastly, the papers that implicitly analysed the connections between M&A and open innovation have highlighted the following aspects. The authors of paper number classified 13 types of new open innovation modes, including M&As as “Acquiring companies with promising technologies, in case of having difficulty with in-house development (e.g. high risk technologies)” ([Abulrub and Lee, 2012](#)). In paper number 14, the authors argue that “M&A has a negative and significant impact on R&D intensity, decreasing in-house R&D and external technological sourcing” ([Cefis and Triguero, 2016](#)).

Discussion and contributions

Through this study, we are able to answer the two research questions proposed in the introduction to this paper. An SLR was conducted to achieve the purpose of this paper. This research method was used to underline the link between M&A and innovation, giving particular attention to the paradigm of open innovation. In particular, a SLR permits a rigorous, neutral and literature-wide assessment of study results, quality and design. We found that, while M&A and the concept of innovation are widespread connected within mainstream studies, this is not the same for the relationships between M&A and open

innovation. In particular, there is only a limited amount of research (seven papers in our study) that is concerned with open innovation and M&A together. With the acquisition of innovative firms being seen as an essential means to obtain new ideas, and open innovation being on the increase, the combination of these phenomena would be of high theoretical relevance for advancing research (Oberg, 2016).

The theoretical contributions of this paper are at least two. First, we found that the link between innovation and M&A is quite well established in the recent literature, and it is addressed through qualitative, quantitative and conceptual studies. The variety and the quantity of the journals that have evaluated the topic in recent years are sufficient to highlight the relevance of the theme. Research on this topic has been published in 43 different journals, and the *Strategic Management Journal* is the journal with the most publications (a total of four).

Second, the same cannot be said for studies that link M&A with open innovation. This fact is confirmed by the very low number of papers we found in our study that explicitly (five papers) or implicitly (two papers) connect these two important streams of research. Our analysis confirms what has been highlighted recently by Oberg (2016), that an analysis of the existing literature shows that there is quite a limited amount of research concerning open innovation and acquisitions together. This opens up space for many research studies, both qualitative and quantitative, on the link between open innovation and M&A. Among the 55 papers, only a few were identified that addressed open innovation. Six out of the seven that addressed open innovation used an empirical quantitative approach, and the other used an empirical qualitative approach, confirming that the relationship between M&A and open innovation has not yet been theorized and studied in depth.

Conclusion, limitations and future research

This paper sets out to explore, through an SLR, the literature on (open) innovation and M&As. We can conclude that there is established literature that addresses the concepts of M&A and innovation jointly. However, we have shown in this review that we cannot confirm the same about M&A and open innovation. While it is common in the literature to explain open innovation practice and to investigate open innovation sources, no study has yet systematically captured it in relation to M&A. In particular, there are many implications that can be studied and mastered, but only if researchers consider M&A activities as a reason for open innovation. More research is necessary to examine M&A operations under the wider approach of open innovation. This study can be used as an input for future study with the aim of focusing more on M&A operations and, specifically, their relationship with open innovation.

For example, it could be interesting to explore the effects of M&A as an individual open innovation practice on the innovation performance of firms, and/or to investigate whether there are some complementary or substitute effects with other well-established open innovation practices. In fact, in some cases the amount of resources needed for a long M&A process can mean that a firm does not have enough resources to pursue also open innovation activities.

This qualitative analysis provides a view of the relationship between M&A and the concept of innovation in the current scenario, with particular reference to the open innovation approach. However, this study offers a number of considerations that cannot be generalized because of the subjectivity of the choices in relation to the period of analysis and the database used. In its choice of search phrases, the findings only cover the literature that refers to two main key terms: "M&A and Innovation" and "M&A and Intellectual Capital". The methodological choices therefore had a great influence on the results of our analysis.

Moreover, we believe that more studies are also needed on the differences between MNEs and SMEs. This is because several empirical studies have confirmed that most open innovation adopters are larger firms (Keupp and Gassman, 2009; Lichtenthaler and Ernst, 2009). However, Van de Vrande *et al.* (2009) focused their study on how open innovation practices are applied by small- and medium-sized enterprises (SMEs). In our research, we found few papers that addressed the differences between firms, and these differences are crucial, particularly with regard to the resources available to perform this activity as well as its operational implementation. This may lead to an improvement in the current literature. The objective could be to find out how a firm changes specifically through M&A operations, and the effects of M&A on open innovation strategy.

Finally, this work is limited to a literature review with a specific focus on M&As and types of innovation. More empirical qualitative and quantitative studies need to be developed with a particular focus on open innovation, and this effort will complement prior research in the understanding of the interrelationships among M&A and open innovation.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
1	Shin <i>et al.</i> (2017)	Empirical quantitative	“The purpose of this study is to investigate the effects of open innovation, especially focusing on technological M&A, on subsequent innovation and changes to the firm’s core technological portfolio. The results confirm that while none of the investigated knowledge characteristics of the target firm is advantageous for post-M&A innovation outcomes in existing core areas, similarity of the target firm does facilitate post-M&A innovation outcomes in enhanced core areas”
2	Mawson and Brown (2017)	Empirical qualitative (Case study)	“This paper examines the dynamics of entrepreneurial acquisitions undertaken by UK high growth small and medium enterprises (SMEs). While entrepreneurial acquisitions are increasingly deployed by SMEs, little is known about their antecedents, motivational drivers and organisational outcomes. Drawing on detailed case study evidence from Scotland, the key factor found to be driving these acquisitions was the desire to augment and exploit technological complementarities between the acquiring and acquired firms. Acquisition can therefore be conceptualised as an advanced stage of the outside-in ‘open innovation’ strategies proactively used within these innovative SMEs. Firms executing this strategy typically have an acute propensity for risk, a desire for close customer engagement, effective business models and strong external orientation. The work suggests that greater attention should be paid within M&A theory to the dynamics of these types of smaller scale entrepreneurial acquisitions”
3	Shepherd (2017)	Empirical quantitative	“Whereas a few decades ago almost all drug discovery took place inside traditional pharmaceutical companies, today most drug innovation is externally-sourced from biotech companies and smaller firms. Internal R&D is no longer the primary source, or even an important source, of drug innovation. As a result, analyses that focus on the impacts of pharmaceutical consolidation on internal drug innovation are incomplete and missing the point. Instead, merger analyses should examine whether consolidation increases demand for externally-sourced innovation and, ultimately, strengthens aggregate drug innovation”

Table AI.
Summary of the studies analysed

(continued)

Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
4	Da et al. (2017)	Empirical quantitative	“In this article, we analyse how shared team and task mental models, developed prior to an acquisition, affect exploration and exploitation activities in the post-acquisition phase, and how these effects are dependent on relative size. With a sample of 101 transactions of acquirers from the German-speaking part of Europe, we provide empirical evidence that both shared team and task mental models positively influence exploitation activities following an acquisition, whereby only shared team mental models (TMMs) are beneficial for exploration. We provide empirical evidence that shared mental models in terms of task and team are an important informal source for enhancing exploration and exploitation innovation activities. However, this source of informal coordination is contextual. Although the relationships on exploitation are stable, the beneficial effect of TMMs on exploration is sensitive and devitalized by an increasing relative size. Implications for further research and management practice are given”
5	Saboo et al. (2017)	Empirical quantitative	“Using 319 biopharmaceutical acquisitions and a random-effect regression model that accounts for unobserved heterogeneity and the endogeneity of relational and innovation overlap, the authors find that innovation overlap has a positive effect, whereas relational overlap has a negative effect, on acquisition outcomes”
6	Cammarano et al. (2017)	Empirical quantitative	“The study provides a methodology for supporting decision-makers in assessing firms’ open innovation adoption, also performing the benchmark with competitors and R&D partners. The previous recourse to specific innovation practices influences the current practice selection. R&D collaboration, outsourcing and M&As are employed to pursue exploration. Past purchase of patents increases the likelihood to achieve architectural and radical innovation in current activities. The work contributes to the current debate considering the effect of a combination of innovation practices on knowledge management strategies and type of innovation output, with a particular focus on open innovation activities. Moreover, the separation between the impact of previous and current innovation practices provides useful insights”

*(continued)***Table AI.**

Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
7	Spoor and Chu (2017)	Desk qualitative	“Globally, organizations spend billions on mergers and acquisitions (M&As) each year; however, it is commonly estimated that at least half of these ventures fail. Two factors that contribute to this high failure rate are the difficulty in merging diverse areas of organizational knowledge and developing employees’ organizational identification with the post-M&A organization. In this article, we recommend the strategic use of organizational communities of practice (CoPs), groups where people share knowledge, to improve knowledge sharing within the post-M&A organization. We also argue that CoPs can indirectly increase knowledge sharing by easing M&A-triggered social identity concerns and fostering post-M&A organizational identification. We develop conceptual propositions for the relationships between CoPs participation, organizational identification, and knowledge sharing in the post-M&A organization. We also argue that the extent to which CoPs participation can increase organizational identification and knowledge sharing will depend on the post-M&A organization’s overall business strategy and whether it is primarily concerned with explicit or tacit knowledge”
8	Oberg (2017)	Empirical qualitative (Multiple case study)	“The present paper aims to add to this view through pointing out how knowledge on how to acquire and how to integrate, follows also from other parties and their experiences. The paper discusses and classifies sources, directions and outcomes of knowledge transfer on acquisitions from a stakeholder point of view. Focus is on external stakeholders and knowledge is divided between knowledge on acquiring and knowledge on integrating, thus dealing with the pre- and post-merger stages of acquisitions. The paper adopts a multiple case study research design to illustrate its point”
9	Mazon et al. (2017)	Empirical qualitative (Multiple case study)	“This qualitative study, which is based on multiple cases, aims to analyze the pattern of acquisitions by Brazilian multinationals, such as Gerdau in the steel industry, Petrobrás in the oil and gas industry and Vale in the mining industry, to infer the likely knowledge motivations underlying the acquisitions of these firms. This study makes three contributions. First, the need to analyze the potential gains of new knowledge acquisition in domestic and cross-border expansion. Second, considering the opportunity to explore new resources and knowledge even for firms in commodity industries. Third, considering how the equity held is a structural solution that needs to be adjusted to the knowledge strategy”

Table AI.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
10	Bauer <i>et al.</i> (2016)	Empirical quantitative	“Cultural differences are an important issue for cross-border M&A. Empirical evidence for the impact of cultural differences on M&A performance is mixed. A major reason for these inconclusive results relies on integration. One main motive for cross-border transactions is the acquisition of innovative capabilities. In a study of innovation-driven M&A in the German-speaking part of Europe, we find different effects of human and task integration on the innovation outcome after the transaction”
11	Wubben <i>et al.</i> (2016)	Empirical qualitative (Multiple case study)	“The purpose of this paper to develop a conceptual framework on innovation synergy realisation in large M&As, that relates the following components: (1) strategic M&A characteristics; and (2) post-M&A integration mechanisms; to (3) innovation synergy realisation. The research explored how different innovation synergies were achieved in nine large medium-tech and high-tech M&As in the life sciences. From this case studies research, it turns out that higher degrees of technological relatedness allow for the realisation of more types of innovation synergy, brought about by the more demanding integration mechanisms structural linking and process re-design”
12	Jo <i>et al.</i> (2016)	Empirical quantitative	“We investigate the determinants of innovation creation through technological M&As. Based on the concept of relative absorptive capacity, the study examines how the acquiring firm absorbs and assimilates the knowledge of the acquired firm and creates innovation. Specifically, the technological M&As are examined by presenting dyadic perspective variables, including technological similarity and technological digestibility which affect the assimilation, transformation, and exploitation processes of the absorptive capacity. We additionally investigate the role of M&A experience as a moderator of dyadic characteristics and innovation performance of technological M&As. Two hundred and twelve cases of technological M&As in the biopharmaceutical industry from 1993 to 2007 are investigated using zero-inflated negative binomial regression and negative binomial regression. The findings confirm a positive effect of acquiring small firms having a modest level of

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Table AI.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
13	Valentini (2016)	Empirical quantitative	similar knowledge on post-M&A innovation performance. Moreover, this study highlights the importance of the dyadic perspective in advancing the understanding of technological M&A” “We investigate the effect of M&A on the innovation strategy of merging firms’ competitors. We argue that while merging firms may reduce their commitment to innovation in the period following the deal because of an increased focus on short-term M&A implementation and financial considerations, rival firms can on the contrary exploit this moment of inertia to broaden their research and outperform rivals, producing more impactful innovations. We suggest merging firms’ competitors increase the breadth of their technological search, even though this may be risky: If their attempts do not achieve the desired results, the consequences are relatively less harmful, as also their competitors are slowing down their innovation pace in the aftermath of M&A. Using data from European firms in the pharmaceutical industry, we find evidence consistent with these hypotheses”
14	Cefis and Triguero (2016)	Empirical quantitative	“This paper investigates the effects of mergers and acquisitions (M&A) on corporate research and development (R&D) strategies using firm-level data on the Spanish manufacturing sector. The focus of the study is to determine whether M&A affects R&D portfolios by increasing or decreasing innovation input, such as in-house R&D, external R&D or both. The results show that M&A has a negative and significant impact on R&D intensity, decreasing in-house R&D and external technological sourcing. M&A enables the rationalization of R&D capacity, implying a decrease in R&D efforts. M&A negatively affects both types of R&D, but, on average, the effect is more negative on external R&D”
15	Han <i>et al.</i> (2016)	Empirical quantitative	“This research analyses the effects of the knowledge overlap between acquirer and target firms on the performance of technological mergers and acquisitions (M&As). Extending previous research that has focused on the quantitative characteristics of knowledge, this research introduces a framework capturing the effects of both the quantity and quality of knowledge in overlapped and non-overlapped parts of the knowledge base on subsequent innovation performance. Analyzing a data set of 192 technological M&As of 162 high-technology firms from 2001 to 2009, the results show that a high quality of overlapped knowledge has a positive

Table AI.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
16	Amir-Aslani and Chanel (2016)	Desk qualitative	<p>effect on subsequent innovation performance, while the effect is negative for non-overlapped knowledge quality. In addition, this research investigates the influence of the knowledge quantity on subsequent innovation performance”</p> <p>This paper aims to review the latest management developments across the globe and pinpoint practical implications from cutting-edge research and case studies. Acquiring innovation will continue to be a necessity for pharmaceutical companies and to enjoy a sustainable advantage; they have the obligation to look for competitive advantage through coordination between both upstream and downstream capacities. A strict focus on the core competency of the enterprise is fast becoming obsolete. The paper provides strategic insights and practical thinking that have influenced some of the world’s leading organizations”</p>
17	Aminova (2016)	Empirical qualitative (Multiple case studies)	<p>“A five-step scheme of analysis is aimed to assess previous M&A record, intellectual property (IP) portfolios of the focal companies as well as the relevant technological context, and construct pathways of potential innovation activities using elements of a scenario technique and road mapping. The framework has been tested on the deals including both large concerns and small and medium-sized enterprises (SME). We summarize the paper by reflecting on the merits and limitations of the framework on the way to our objective – to provide grounded forecasting triggered by M&As to support the decision-making”</p>
18	Aklamanu <i>et al.</i> (2016)	Desk qualitative	<p>“This paper primarily focuses on the phenomenon of social capital and HRM practices – one of the primary means by which knowledge sharing can occur within firms. The main aim of this paper is to provide an alternative framework that introduces the literature on HRM and social capital to discuss how HRM practices and the various dimensions of social capital may enhance knowledge sharing in post-M&A integration. Drawing on the literature on social capital and HRM, we offer an alternative view on the issue of knowledge sharing in M&A integration by explaining how specific HRM practices that have an impact on employees’ knowledge, skills and abilities for participating in knowledge sharing activities may depend on relational, cognitive and structural social capital”</p>

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
19	Vasilaki <i>et al.</i> (2016)	Desk qualitative	“This paper develops a conceptual framework that focuses on the moderating role of transformational leadership on the achievement of human integration and organizational identification in M&A integration. We argue that communication, employee involvement, teamwork, and training and development have a positive effect on employee behavior and their identification with the newly formed organization. Moreover, we argue that transformational leadership behaviors will moderate the implementation of HRM practices in M&As, leading to positive employee behaviour and employee identification in the new organization. We suggest that further research is necessary to test propositions of the present study in order to achieve finer-grained understanding of the role of transformational leadership on the achievement of human integration and organizational identification in M&A integration”
20	Brueller <i>et al.</i> (2016)	Empirical quantitative	“The extant literature tends to frame mergers and acquisitions (M&As) and post merger integration (PMI) as strategies and outcomes, but this framing often leaves their underlying processes underexplored. We address this gap by redirecting attention to the view that M&As are largely embedded in social and human practices. Our conceptual study identifies three generic M&A strategies—annex & assimilate, harvest & protect, and link & promote—and matches them with three well-known PMI outcomes (i.e., absorption, preservation, and symbiosis, respectively). Using a configurational perspective and drawing upon the ability-motivation-opportunity (AMO) model, we develop a conceptual framework that reveals why and how AMO-enhancing human resource management (HRM) practices can link M&A strategies and PMI outcomes. Finally, we elaborate on the theoretical and practical contributions and chart a course for future inquiry and research applications for the M&A-HRM-PMI triad and its processes”
21	Ahammad <i>et al.</i> (2016)	Empirical quantitative	“The aims of the paper are to provide new insights into the factors that facilitate or impede knowledge transfer, and to examine the impact of knowledge transfer on CBA (Cross border acquisitions) performance. The data were gathered via a cross-sectional survey using a questionnaire on a sample of UK firms that had acquired North American and European firms. The findings indicate that knowledge transfer and employee retention have

Table AI.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
22	Ahn, Minshall and Mortara (2015)	Empirical quantitative	<p>positive influence on CBA performance. In addition, organizational culture differences have a negative influence on CBA performance, but also mediate the relationship between knowledge transfer and CBA performance. No direct or mediating effect of national cultural distance has been found on knowledge transfer and CBA performance. One of the important contributions of the present paper is the development of a conceptual framework incorporating the mediating effect of national cultural distance, organizational culture differences, and employee retention on knowledge transfer and acquisition performance”</p> <p>“This paper attempts to deepen understanding of the relationship between open innovation (open innovation) and firm performance in small and medium-sized enterprises (SMEs). Based on survey data from 306 Korean innovative SMEs, the results of this study show that: (1) broad and intensive engagement in open innovation and cooperation with external partners are positively associated with firm performance; (2) technology and market-oriented open innovation modes (Joint R&D, user involvement and open sourcing), involving relatively low level of changes, can positively contribute to performance enhancement; and (3) innovative SMEs benefit from working with non-competing partners, such as customers, consultancy/intermediaries and public research institutes. This work has broadened the evidence available on SMEs’ open innovation adoption and has proposed a new way to study open innovation adoption and implementation”</p>
23	Cefis and Marsili (2015)	Empirical quantitative	<p>“This paper investigates whether involvement in M&A triggers distinct patterns of innovative behaviour across firms, and whether this effect is conditional on firm size. The analysis combines data from four waves of the Community Innovation Survey (CIS) and the Business Register of Dutch manufacturing firms. We observe that M&As influence the probability that firms will begin innovation activities or persist with them, and these effects vary at different points in the firm size distribution”</p>
24	Dunlap <i>et al.</i> (2015)	Empirical quantitative	<p>“Innovation creates significant challenges for firms in high-technology industries. This article examines how the use of external knowledge acquired from mergers and acquisitions (M&As) and joint ventures (JVs) influence the nature of innovative competence in the global pharmaceutical industry. We create a unique database on never-before approved products</p>

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
			that measure the scientific merit of new, exploratory product innovations, ranging from radical to incremental. We then follow their market success by recording the number of new exploitative product innovations that stem from these product innovations and that are later approved and subsequently marketed. Using a large data set spanning a 15-year period, we find that firms were able to “make up” for their lack of exploitation or exploration innovative capabilities with M&As and JVs. These external knowledge acquisition strategies were found to overcome internal processes that otherwise could cause firms to overemphasize exploitation over exploration and vice versa. Our findings suggest that acquiring external knowledge via M&As is associated with diminished exploratory product innovation, while assimilating external knowledge sourced from JVs is associated with a reduction in new exploitative product innovation”
25	Boring (2015)	Empirical quantitative	“Using a data set of Norwegian firms, an examination is made of the relationship between firms’ R&D activities and their survival. A firm may exit the market through closure, or merger and acquisition (M&A). The analysis is based on a discrete time competing risks model with unobserved heterogeneity. We find that product-innovative firms have a higher probability of exit due to M&A, but only if they also introduce new products into their market. This highlights the importance of differentiating between different groups of product-innovative firms. None of the R&D and innovation activities considered has significant effects on the probability of firm closure”
26	Chen, Chen and Li (2015)	Empirical quantitative	“This paper uses PLS technique to analyse the inherent impact of resource similarity, resource complementarity, and their interaction effect on MA innovation performance mediated by integration degree and target autonomy in technology – sourcing overseas MA. The results show that compared with resource similarity, resource complementarity can better generate innovation value, because it leads to high levels of both integration and target autonomy which contribute to economies of scope and synergy effects”
27	Liu (2015)	Empirical quantitative	“It has close relations between listed firm’s innovation output and its MA activity. Simultaneously, the innovation output is influenced by the corporation’s financial situation. The essay analyses the innovation output of merged and target firms to verify the causality between MA activity

Table AI.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
28	Datta and Roumani (2015)	Empirical qualitative (Case study)	and a firm's innovation incentives. The essay finds that the MA activity may stimulate industry synergy; the merged firms have the positive CAR around the announcement date. Overall, the essay proves that MA activity is one of the most important ways to improve the firm's innovation output" "Do acquisitions lead to instrumental innovations related to the acquired knowledge? Past arguments on vertical integration espouse how a quest for knowledge drives acquisitions culminating in innovation performance. Using Google and Yahoo as cases-in-point, we examine how facets of acquired innovation knowledge affects post-innovation performance. In particular, the apparently opposing fortunes of Google and Yahoo allow us to investigate the pace of their innovation performance as a hazards model. Results from our investigation highlight Google's ambidexterity over Yahoo with a swifter, systematic pace of innovation performance – from hastening time to patenting new ideas to the time to releasing new applications from acquisitions" "Corporate restructuring has become a tool of business integration and valuation strength across economies worldwide. Besides, financial implications there are other non-financial issues also having direct impact on the success of any corporate merger or acquisition. One of those issues is the human capital of any corporate body. Human capital is the human resources having cultural diversity within the corporate body. This study analyses the impact of human and cultural factors on the objectivity and success of any corporate restructuring exercise"
29	Sharma (2015)	Empirical quantitative	"This article proposes a three-stage model of mergers and acquisitions that systematically identifies several human resource issues and activities. The article concludes with a description of the role and importance of the HR department and leader"
30	Naghshbandi and Ombati (2015)	Desk qualitative	"We examine the relation between the trust that employees have in management and the M&A activity of firms. We measure this trust by using rankings compiled by the Great Place to Work Institute (GPWI) from 1998 to 2011. Although the volume of M&A activity is not significantly different for firms with strong cultures of trust ("SCT firms") versus other firms, the relative size of acquisitions announced by SCT firms is significantly smaller than the size of acquisitions announced by other firms. Furthermore, when SCT firms announce relatively large acquisitions, bidder returns and the
31	Bargeron <i>et al.</i> (2015)	Empirical quantitative	

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
			per cent change in the combined values of bidders and targets are lower than the corresponding returns for other firms. Finally, when SCT firms make large acquisitions, they are significantly more likely to suffer a loss in their GPWI ranking as compared with other SCT firms. Overall, the results are consistent with the conclusion that the M&A policies of firms are influenced by a culture of trust between employees and management”
32	Szucs (2014)	Empirical quantitative	“We evaluate the impact of M&A activity on the growth of R&D spending and R&D intensity of 265 acquiring firms and 133 merger targets between 1990 and 2009. We use different matching techniques to construct separate control groups for acquirers and targets and use appropriate difference-in-difference estimation methods to single out the causal effect of mergers on R&D growth and intensity. We find that target firms substantially decrease their R&D efforts after a merger, while the R&D intensity of acquirers drops due to a sharp increase in sales
33	Bena and Li (2014)	Empirical quantitative	“Using a large and unique patent-merger data set over the period 1984 to 2006, we show that companies with large patent portfolios and low R&D expenses are acquirers, while companies with high R&D expenses and slow growth in patent output are targets. Further, technological overlap between firm pairs has a positive effect on transaction incidence, and this effect is reduced for firm pairs that overlap in product markets. We also show that acquirers with prior technological linkage to their target firms produce more patents afterwards. We conclude that synergies obtained from combining innovation capabilities are important drivers of acquisitions”
34	Arvanitis and Stucki (2014)	Empirical quantitative	“While previous studies on mergers and acquisitions (M&As) mostly relied on large firms, our study is based on a sample that includes all Swiss M&As that took place in the period 2006–2008, mostly of which have been SMEs. We investigate the firm characteristics that determine the innovation and economic performance of M&As. The performance measures are based on firms’ assessments. These measures are regressed on a series of possible determining factors as postulated in existing theoretical and empirical literature. M&A performance is primarily affected by specific M&A characteristics, but not by general market characteristics such as demand development or competition conditions”

Table A1.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
35	Sabidussi <i>et al.</i> (2014)	Empirical quantitative	“This paper assesses the impact on innovative performance of alternative external sourcing strategies. In particular, the study under discussion compared external sourcing strategies based on specialization to those based on integrating various sourcing modalities (e.g., alliances and M&As). Survey data from three waves of the Community Innovation Survey (CIS) in the Netherlands were used to investigate the implications of these sourcing strategies for innovative performance. The findings indicate that synergies exist among external sourcing modalities”
36	Yang <i>et al.</i> (2014)	Empirical quantitative	“Existing studies only employ financial and managerial indicators when constructing M&A prediction models, and select candidate target companies without considering the profile of the bidder company or its technological compatibility with candidate target companies. Such limitations greatly restrict the applicability of existing studies to supporting technology M&A predictions. To address these limitations, we propose a technology M&A prediction technique that encompasses technological indicators as independent variables and accounts for the technological profiles of both bidder and candidate target companies. Forty-three technological indicators are derived from patent documents and an ensemble learning method is developed for our proposed technology M&A prediction technique”
37	Humphery-Jenner (2014)	Empirical quantitative	“This paper analyses acquisitions made by HTV firms, focusing on whether the acquirer (not the target) is entrenched in order to examine the impact of entrenchment managerial decision-making. The results show that HTV firms that are entrenched make acquisitions that generate more shareholder wealth and are more likely to increase corporate innovation, suggesting that ATPs can be beneficial in some firms”
38	Sears and Hoetker (2014)	Empirical quantitative	“The performance of technological acquisitions depends heavily on the overlap between the knowledge bases of the target and acquirer. We argue that overlap is best viewed as two distinct constructs: target overlap, the proportion of the target’s knowledge base that the acquirer already possesses, and acquirer overlap, the proportion of the acquirer’s knowledge base duplicated by the target. Each affects the value created from the firms’ technological capabilities differently due to absorptive capacity, knowledge redundancy, and organizational disruption”

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Table AI.

Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
39	Colombo and Rabbiosi (2014)	Empirical quantitative	<p>“This paper aims to disentangle the mechanisms through which technological similarity between acquiring and acquired firms influences innovation in horizontal acquisitions. We develop a theoretical model that links technological similarity to: (i) two key aspects of post-acquisition reorganization of acquired R&D operations – the rationalization of the R&D operations and the replacement of the R&D top manager, and (ii) two intermediate effects that are closely associated with the post-acquisition innovation performance of the combined firm – improvements in R&D productivity and disruptions in R&D personnel. We rely on PLS techniques to test our theoretical model using detailed information on 31 horizontal acquisitions in high- and medium-tech industries. Our results indicate that in horizontal acquisitions, technological similarity negatively affects post-acquisition innovation performance and that this negative effect is not mediated by the reorganization of the acquired R&D operations.”</p>
40	Taneja and Saxena (2014)	Desk qualitative	<p>“Mergers and acquisitions are used by firms to strengthen and maintain their position in the market place. It is a way for companies to grow and expand into new markets, incorporate new technologies and to innovate and this business is rapidly increasing. Yet their success is by no means assured. To the contrary, a majority fall short of their stated goals and objectives. Consequently, there are numerous social costs, including lost jobs, lost income to families and lost taxes to the local communities. Most of these social costs are not there when mergers and acquisitions are successful. While some failure can be explained by financial and market factors, a substantial number can be traced to neglected ethical, social & human resource issues and activities. These issues have to be resolved in order to ensure a successful merger. This paper covers types of mergers and acquisitions, the reasons for their successes and failures & will highlight Ethical, Social and Human Resource issues that need to be addressed while undertaking M & A activities”</p>
41	Grimpe and Hussinger (2014)	Empirical quantitative	<p>“Extant literature holds that firm acquisitions create value through innovation if the knowledge bases of the acquirer and the target complement each other. Little is known about the value that patents associated with a target’s knowledge convey to the acquirer, i.e., their value in securing market exclusion and freedom to operate in R&D. We argue that such property rights hold pre-emptive power allowing firms to capture the value from combining</p>

Table AI.

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
42	Kleer and Wagner (2013)	Empirical quantitative	complementary technologies and to realize gains from trade in strategic factor markets. Our results for a sample of 1,428 acquisitions indicate that-controlling for technological value-acquired pre-emptive power is an important determinant of the acquisition price, particularly when the acquirer is technology intensive and acquired patents are highly related to the acquirer's knowledge base" "Acquisition of innovative firms is a widely observed phenomenon in high-tech industries. Based on distinct advantages of large and small firms, in this paper, we build a tournament model with possible acquisition activity of large firms to derive hypotheses on interdependencies between acquisition frequency and post-acquisition success rates. We find empirical support for our hypotheses that (1) acquisitions increase overall innovation output and (2) that the number of acquisitions is higher in industries with larger heterogeneity between established firms and young start-ups. However, our third hypothesis derived from the formal model that innovation success following from acquisitions varies across industries is only partially confirmed"
43	Xu <i>et al.</i> (2013)	Empirical quantitative	"Technology-oriented M&A is a combination of connotation development with external growth, which receiving increasing attention from enterprises and relatives. Taking technology-oriented MAs of Chinese listed companies ranging from 1999 to 2004, the empirical research shows that technology M&A has a positive effect on the value added of the acquiring firm; The extensive technology-oriented M&A is worse than the intensive technology-acquisition in the viewpoint of value added, related transactions within identical administrative division has a positive effect on the value added of the acquiring firm"
44	Suh <i>et al.</i> (2013)	Empirical quantitative	"Based on the resource-based view and organizational learning perspective, our empirical research focuses on the effects of European firms' innovative capabilities and experience on their acquisition performance when targeting United States firms. The results indicate that both innovative capabilities and experience have a positive effect on acquisition performance. This suggests that in order to have successful acquisition performance, European firms need to reinforce their innovative capabilities and commit to accumulating experience in articulating cross-border acquisition strategy. In addition, we discuss the interaction

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Serial No.	Authors (Year)	Methodological approach	Abstract main concepts
45	Rehn and Abetti (2013)	Empirical qualitative (Case study)	effect that relatedness has on the acquisition performance of European firms” “This paper presents an in-depth case study of the transition of R&D and product development procedures after the acquisition of a small entrepreneurial US high-tech company, Intermagnetics General Corporation (IGC), by a leading multinational, Philips of the Netherlands. We summarise the findings of interviews conducted in 2011 of IGC and Philips researchers and managers concerning the 5-year post-merger integration process, the alignment of rewards and incentives, the effect of market life cycle and product development strategies, the redefinition of relationships and expectations, the internal and external driving forces and the successful results”
46	He and CHEN (2013)	Empirical quantitative	“The paper analyses the relationship between investors’ legal protection, local protection and technology MA performance. Using samples listed firms in 2008, the paper finds that investors’ legal protection and technology MA performance reflects the positive correlation. Enterprises in the same province carry on technology MA performance more remarkable. Investors’ legal protection makes less effect. The merger is not in the eastern coastal areas to carry on technology MA performance more remarkably. Investors’ legal protection makes less effect”
47	Phillips and Zhdanov (2013)	Empirical quantitative	“We provide a model and empirical tests showing how an active acquisition market affects firm incentives to innovate and conduct R&D. Our model shows that small firms optimally may decide to innovate more when they can sell out to larger firms. Large firms may find it disadvantageous to engage in an “R&D race” with small firms, as they can obtain access to innovation through acquisition. Our model and evidence show that the R&D responsiveness of firms increases with demand, competition and industry merger and acquisition activity”
48	Granstrand and Höggersson (2013)	Empirical qualitative (Case study)	“This article deals with the intellectual property (IP) disassembly problem, which is an increasingly important problem in various contexts. The IP disassembly (IPD) problem is defined as the problem of finding a contractual arrangement for allocation of IP rights and licenses that allows for separating and disintegrating a company, business unit, project entity, resource set, or IP unit in order to enable a transaction, organizational transfer, or dissolution of it. Based on a comparative case study of corporate

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49	Castro-Casal <i>et al.</i> (2013)	Empirical quantitative	<p>transactions of Saab Automobile and Volvo Car Corporation this article conceptualizes and characterizes the problem and then develops an IPD framework for managing it”</p> <p>“Mergers and acquisitions can be a mechanism used by firms to access innovative knowledge, including intellectual property, and to strengthen and expand their core capabilities. In the mergers and acquisition context, the creation of value depends on the transfer of capabilities and knowledge being carried out successfully during the post-acquisition integration process. The paper adopts this view. It examines the role of the top management and personnel who hold knowledge and skills linked to the capability of the acquired firm considered most valuable by the acquiring firm in the transfer of knowledge from the acquired firm to the acquiring firm. The paper also examines whether the impact of the retention of the acquired firm’s high-value human resources (HVHR) on knowledge transfer is moderated by the degree of embeddedness of the knowledge to be transferred. Furthermore, the study identifies the factors that influence the retention of the acquired firm’s HVHR. We tested the model using data from a sample of 57 domestic, related, friendly Spanish mergers and acquisitions belonging to a wide variety of industries. The results support the notion that the more embedded the knowledge, the greater the impact of the acquired firm’s HVHR retention on the knowledge transfer”</p>
50	Valentini (2012)	Empirical quantitative	<p>“I explore the effect of M&A on the patenting quantity and quality of the firms involved in a deal. Three measures of quality are considered: impact, generality, and originality. The impact of a patent denotes its influence on future inventions. Generality refers to a patent’s applicability across technological fields. Finally, the originality of a patent indicates the extent to which an invention synthesizes diverse technological inputs. Applying a matching estimator to data from the U.S. ‘medical devices and photographic equipment’ industry from 1988 to 1996, I find that M&A have a positive effect on patenting output, but decrease patent impact, originality, and generality”</p>
51	Gantumur and Stephan (2012)	Empirical quantitative	<p>“This article examines the innovation determinants of M&A activity and the consequences of M&A on technological potential and innovation performance. We extend the resource-based theory in elucidating external technology sourcing and provide empirical evidence on the keen reliance of the equipment firms</p>

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			on M&A as a technology sourcing strategy for the period 1988–2004. Employing the matching propensity score approach, this study provides evidence that mergers realize a significant growth in the innovation performance of firms. The post merger innovation performance, in turn, is driven by both the prior success of in-house R&D commitment and the deterioration of internal technological capabilities at acquiring firms”
52	Chen and Wang (2012)	Empirical qualitative	“The merger and acquisition is an efficient way of acquiring technological resource, which has remarkable advantages in introducing technology, talents, market and fund for researching and development. However, it is also a double-edged sword, which creates positive effects on technological innovation only when we make use of favourable conditions and avoid unfavourable ones. The effective consolidation after the merger and acquisition is the key for enterprises to raise the independent ability of researching and development”
53	Razi and More (2012)	Empirical quantitative	“This study examines the impact of a change (namely an acquisition) on the effectiveness of human capital of a High Performance Work System (HPWS) practices in a service setting. It specifically investigates human capital dimensions such as employee incentives, skills, and participation, firm (specific knowledge and customer relations performance. This paper builds upon, and goes beyond previous research studies by analysing the impact of acquisition on the association among the variables of an existing model. Results show that acquisition has had no negative impact on the effectiveness of the various components of HPWS practices, such as firm specific knowledge of the employees, customer relations, and overall performance of the organization”
54	Lehman <i>et al.</i> (2012)	Empirical quantitative	“Although acquisitions of high-tech entrepreneurial firms are of great popularity within the technology transfer process, the limited empirical evidence on this type of technology transfer shows that these acquisitions often lead to dismal results in that a large number of acquired key inventors leave their companies after an acquisition and those that remain exhibit poor performance. This study aims at explaining this phenomenon and adds additional empirical results and explanations to the matching theory of ownership changes. Using a hand collected dataset of all German IPOs from 1997 until 2006, this study shows that the probability of ownership in a young and high-tech firm’s assets being reallocated

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55	Abulrub and Lee (2012)	Empirical quantitative	<p>by means of a takeover significantly decreases with the amount of intangible and complementary assets that are owned by the owner-manager”</p> <p>“Innovation is the key to maintain competitive advantage in a market and gain leadership. Open innovation is a pioneering mechanism with increasing number of studies in the literature. However, there is lack of studies on open innovation in South Korea. In addition, there are still number of issues unclear in open innovation theory because of its wide concept. Therefore, the research aims to analyze the characteristics of open innovation in South Korea and examine the challenges of open innovation theory. The research surveyed about 85 South Korean companies to investigate whether there are significant differences in open innovation activities in four environmental factors (industry type, company size, market type, and R&D intensity) and to examine current challenges of open innovation and its nature The results of the survey indicated that South Korean companies’ open innovation generally diverge from main trends in open innovation shown in existing studies</p>

Table AI.

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