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Diversification in digital platforms: a study for Google and Facebook based on the resource-based M&A approach

Diversificação nas plataformas digitais: um estudo para o Google e Facebook a partir da abordagem de F&A baseada em recursos

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Abstract: This paper seeks to understand the logic of diversification followed by the two main global digital platforms - Google and Facebook - in their M&A operations, and whether they follow any of the categories provided in the literature: horizontal, vertical, concentric or conglomerate. To this end, a recent literature review on digital platform markets is presented, considering both theory and the experience of international regulators. The theoretical framework of resource-based diversification is then addressed, as well as the specific cases of Google/Alphabet and Facebook/Meta, using data from crunchbase. It was concluded that both companies had a diversification trajectory in line with their technological capabilities, initially with vertical and horizontal diversifications to reach new markets, with a focus on expanding into Industry 4.0 technologies.

Keywords: Digital platforms; Emerging technologies; Firm diversification; Google and Facebook; Mergers and acquisitions.
JEL Classification: L2 - Firm Objectives, Organization, and Behavior

Resumo: O presente trabalho procura compreender a lógica de diversificação realizada pelas duas principais plataformas digitais mundiais — Google e Facebook — em suas operações de F&A, com base em algumas das categorias previstas na literatura: horizontal, vertical, concêntrica ou conglomerado. Para isso, apresenta-se a revisão de literatura recente sobre mercados de plataformas digitais, considerando tanto a teoria quanto a experiência das autoridades regulatórias internacionais. Logo após aborda-se o arcabouço teórico de diversificação baseada em recursos e os casos específicos do Google/Alphabet e Facebook/Meta utilizando os dados do crunchbase. Concluiu-se que ambas as firmas tiveram uma trajetória de diversificação coerente com suas capacidades tecnológicas, num primeiro momento com diversificações verticais e horizontais para rumar a novos mercados, com ênfase para a expansão nas tecnologias da indústria 4.0.

Palavras-chave: Plataformas digitais; Tecnologias emergentes; Diversificação da firma; Google e Facebook; Fusão e aquisição.
Código JEL: L2 - Firm Objectives, Organization, and Behavior

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1. Introduction

The five technology giants - Apple, Alphabet (Google), Amazon, Meta (Facebook) and Microsoft - are among the world's largest companies by market capitalization, operating as multilateral platforms in an ecosystem that encompasses products, applications, services, content and users. In 2017 alone, investment in R&D by these companies exceeded US$71 billion and, in the same year, they made 55 different acquisitions in total, most of which were young, innovative startups (GAUTIER; LAMESCH, 2020).

Following Facebook's acquisition of Instagram, an operation worth more than US$1 billion, competition authorities around the world began to discuss and debate more closely the workings of large technology companies, highlighting digital platforms and their market characteristics[1]. Over the last decade, the two largest companies in this segment, Google and Facebook, have suffered a series of lawsuits for anti-competitive behavior.

During the first two decades of this century, both companies systematically strengthened their dominant position by using killer acquisitions, a term derived from the pharmaceutical sector for acquisitions of emerging companies that result in the loss of a potential competitor (OECD, 2020). According to Gautier and Lamesch (2020), this phenomenon is evident in large technology companies, where 60% of acquisitions are discontinued.

It is worth noting that, even in the face of numerous studies on the behavior of mergers and acquisitions (M&A) in high-tech companies, there is still a gap in the understanding of this phenomenon in these companies, as the differences between these firms and the particular characteristics of the digital market must be taken into account. Works such as Argentesi et al. (2019), which look for a certain pattern of action based on analysis of the main mergers and acquisitions of companies in the digital market from the UK competition authority, are exceptions rather than the rule. For these authors, the authorities would need to predict the evolution of the market in the absence of mergers and acquisitions, i.e. the counterfactual scenario, which is extremely difficult in the case of such dynamic firms.

A first step would be to bring reasonably similar companies together. In this sense, Google and Facebook justify themselves by being the two largest digital platforms and dominating search engines, social networks, mobile operating systems and digital advertising in much of the world. Another important characteristic of both companies is the advance, in the last decade, towards advanced digital technologies such as big data, the internet of things, artificial intelligence, among others.

Taking advantage of the lack of a conclusive typification of M&A behavior to guide not only future studies but also the action of competition authorities, this paper seeks to answer the following questions: What is the logic behind the diversification carried out by the world's two main digital platforms - Google and Facebook? Do your M&A

operations follow any of the categories set out in the literature? The hypothesis is that with the gradual advance into activities and markets far from their original operations, they have not only expanded their skills and capabilities, but have also converged on the new technologies of Industry 4.0.

The paper is divided as follows: in addition to this introduction, section two discusses the main characteristics of digital platforms according to the literature and competition authorities around the world; The third section reviews the fundamental economic elements of diversification, based on Edith Penrose's contribution; section four presents the main diversification operation of digital platforms, the Killer acquisitions M&A, and the positive and negative aspects of this type of operation; the following two sections, five and six, explain the case of Google and Facebook and how these firms carried out their M&A in a coherent way for emerging technologies; the last section concludes the diversification trajectory of the two firms, helping to understand how digital platforms work at the beginning of this century.

2. The digital platform market

The literature offers a wide-ranging debate on the definition of digital platforms, both from a market and a technical point of view (ASADULLAH et al., 2018; HEIN et al., 2019), which can be divided into three categories: technical, non-technical and socio-technical. The technical offers a vision that refers to engineering, where according to Gawer (2014), Spagnoletti et al. (2015, p. 364) and Yoo et al. (2012, p.1400), it is considered a technological architecture, a code base where complementary modules from third parties can be added, or a building block, where other companies can develop complementary products or services, thus serving as a basis for building technological systems.

In turn, the non-technical category offers us an approach to commercial networks and markets, which allow transactions between users in a network of suppliers, producers, customers, intermediaries, products and services that are held together in a complementary way through formal contracting or even mutual dependence (PAGANI, 2013; KOH AND FICHMAN, 2014; TAN et al., 2015).

Between the two categories presented, we have the one on which this work is based, justified both by the experiences of the world's regulatory authorities - which will be explored later - and by the scope of its definition. The socio-technical category differs from the others in that it defines a digital platform as technical elements (software and hardware) and associated processes and standards (DE REUVER et al., 2018), being an extensive and extensible entity made up of a code base that facilitates interactions and value creation between different user groups (CUSUMANO et al., 2019; GHAZAWNEH; HENFRIDSSON, 2015; VAN ALSTYNE; PARKER, 2017).

In fact, as Poell et al. (2019) point out, as studies and research into the platform market progressed, new understandings and perspectives were adopted. From a socio-

technical perspective, the authors define digital platform markets as reprogrammable digital infrastructures that facilitate and shape personalized interactions between end users through data collection and algorithmic processing. Later, Poell et al. (2021) refined this definition to infrastructures that facilitate, aggregate, monetize and govern interactions between end users and content and service providers. Table 1 presents the categories, definitions and main authors in a non-exhaustive way.

Table 1: Categories, definitions and main authors on digital platforms

Category	Definition	Authors
Technique	Building block that provides an essential function for a technological system and serves as a foundation on which complementary products, technologies or services can be developed.	Spagnoletti et al. (2015, p. 364); Yoo et al. (2012, p.1400).
	Extensible code base of a software-based system that provides core functionality shared by the modules that interact with it and the interfaces through which they interoperate.	Tiwana et al. (2010, p. 676); Ghazawneh and Henfridsson (2013, p. 3).
	A set of subsystems and interfaces that form a structure from which derived applications can be developed and distributed.	Xu et al. (2010, p. 1305).
Non-technical	Commercial network of suppliers, producers, intermediaries, customers and producers of complementary goods and services that are held together through formal contracting and/or mutual dependence.	Tan et al. (2015).
	Two-sided networks that facilitate interactions between different but interdependent user groups, such as buyers and suppliers.	Koh; Fichman (2014, p. 977).
	A multi-faceted platform that brings together two or more distinct groups of customers (sides) who need each other and where the company builds an infrastructure (platform) that creates value by	Pagani (2013, p. 625).

	reducing the distribution, transaction and search costs incurred when these groups interact with each other.	
Socio-technical	Reprogrammable digital infrastructures that facilitate and shape personalized interactions between end users through data collection and algorithm processing.	Poell et al. (2019).
	Infrastructures that facilitate, aggregate, monetize and govern interactions between end users and content and service providers.	Poell et al. (2021, p. 5).
	Digital platforms bring together consumers and producers with a community of members as their main asset, orchestrating resources, facilitating external interactions and creating network effects.	Van Alstyne; Parker, (2017).

Source: Adapted from Asadullah et al. (2018).

In addition, Evans and Schmalesnsee (2016) point out that an economic agent is considered a digital platform when it meets the following criteria: (i) the existence of two or more distinct consumer groups; (ii) the existence of positive externalities due to the connection or coordination of two groups and; (iii) the need for an intermediary to internalize externalities. Each platform has its own characteristics derived from the services it offers, with a variety of structures and business models. A user on various platforms has access to a wide range of services ranging from basic communication to financial transactions and data storage.

While in theoretical terms there are three conceptual categories, when we look at the practical experience of regulatory authorities the situation changes precisely because of the particularities of each platform and nation. In his seminal work, Cohen (2017) mentions that the locus of activities in the industrial era was the market, idealized for the meeting between buyers and sellers within which prices and quantities were regulated. With the information age, the locus of these activities has become the platform, mediated materially and algorithmically, which includes a broad environment involving social networks, multiple forms of payment, trading systems, among others. The interference goes beyond economic limits and influences social and cultural activities, reshaping work, business, entertainment, social interactions and consumption itself, destabilizing legal and economic constructions based on the locus of the market.

According to CADE (2020) and as explained above, there is no convergence between the various reports from the main authorities and research centers around the world on a single definition of what digital platforms are. In general, firms in this sector are seen as intermediaries connecting two or more user groups benefiting from direct or indirect network effects, with strong indirect network externalities being the source of the formation of multi-sided markets connecting two different but well-identified user groups.

As the market itself does not have a single characteristic that distinguishes it from traditional markets, the confluence of various factors means that digital markets have a differentiated structure that requires appropriate analysis (STIGLER CENTER, 2019). In particular, digital platforms present strong network effects, economies of scale and important economies of scope derived from data exploitation, low marginal cost and global scope. The European Commission (2017) reinforces a similar view, justifying the growth of digital platforms and online ecosystems due to the role of data, increasing returns to scale, network effects and economies of scope.

The UK report (2019) highlights the decreasing average costs, the global nature of these markets and the privileged access to capital sources. Both that country's report and the European Union's report (2019) point out that network effects[2] are the result of the platforms' choices in the design of their interfaces, reducing users' multi-homing[3] capabilities, directly affecting competition in these markets where ecosystems reinforce the monopolizing tendencies of the online market, making multi-homing difficult where the incumbent forces the competing system to offer full service coverage. In this sense, the contribution of the Portuguese report (2019) highlights the growth of cloud computing and its impact on offering increasingly cheaper data storage and processing, diminishing the importance of economies of scale in some cases.

Markets with these characteristics tend to tip, i.e. at a certain point the confluence of these factors quickly concentrates on a single ultra-dominant player. Tipping effects markets initially present intense competition, which over time tends towards concentration in which the monopolistic winner profits from its market power (CADE, 2020). The rents derived from the winning position are defended by high barriers to entry from network effects (difficult migration of consumers to other systems and services), personalized, customized services and growing competition for ecosystems and important economies of scale and scope including those related to data control, preventing the advance of goods and services that are superior to those already offered by the incumbent.

The market power of the incumbent platforms can be seen in the UK report (2019), divided into the following online markets: search, social networks, mobile operating systems and digital advertising, substantially concentrated in two major players, respectively Google and Bing, Google and Facebook, iOS and Android and Facebook and Snapchat. Furman et al. (2019) state that most digital markets are focused on a maximum of two leading competing firms and a small fringe.

Google, YouTube and Facebook led the way as the most visited websites in the world in February 2022, accounting for 91.1 billion visits, 35.9 billion and 21.1 billion respectively. The second most accessed search engine in the same period, Baidu, had 5.6

billion visits, a difference of more than 84 billion against first place. The second most accessed social network, Twitter, had 7 billion visits, a difference of more than 27 billion. Youtube, the platform belonging to the Alphabet group, leads the art and entertainment and TV movies and streaming categories, followed by Netflix (SIMILAR WEB, 2022). Of the ten most accessed websites in the world in 2021, seven are of American origin. In Brazil, in May 2021, Google, Youtube and Facebook maintained their lead, with 4.69 billion, 1.48 billion and 1.21 billion hits, respectively.

In February 2020, the time spent on the UK's top online properties jointly highlights Google and Facebook as responsible for 40% of all consumer time (FURMAN et al., 2019). The Australian case (AUSTRALIAN COMPETITION AND CONSUMER COMMISSION, 2019) for February 2019 follows the same pattern, with 20.5% of online time going to Google, while 18.6% goes to Facebook. Brazil, according to data from WeAreSocial (2021), is the third country that uses social networks the most in the world, averaging 3 hours and 42 minutes a day, behind only the Philippines and Colombia. When you consider work and leisure, Brazilians stay connected for an average of almost 11 hours a day, a time dominated by apps such as WhatsApp, Facebook and TikTok.

In view of the wide-ranging activities presented, Mateus (2019) segments digital platforms into the following activities by purpose:

(i) Search engine platforms: using algorithms, they collect the information requested by users through crawlers[4], making the results available;
(ii) Social media platforms: services that allow users to be included in large communities for sharing personal information;
(iii) Digital content aggregator platforms: intermediary agents that collect dispersed information and aggregate it, such as some specialized journalism portals.

Platforms often combine these three segments. CADE (2021) points out the three most common types of business models:

d) Subscription Model: there are only two parties involved - the service provider and the user who pays a certain subscription to access it - for example, online video and music platforms;

e) Advertising model: the services offered do not represent payment on the part of the user, since the platforms earn indirectly through advertising and the marketing of information. This is the case, for example, with some online newspapers;

f) Open access model: works like a marketplace by connecting suppliers of goods and services with users who may or may not incur subsequent costs. The platform can charge both suppliers and users for buying/selling products, services or applications through the platform. One example is the app store.

We present some basic characteristics of digital platforms, with recent data pointing to the dominant share of Google and Facebook in global consumer use of the

internet. To understand the trajectory of the two firms, it is necessary to review some economic aspects of diversification.

3. Aspects of diversification

Among the seminal studies on firm diversification, the work of Penrose (1959) defines this process as one in which the company, without completely abandoning its original production activities, sets out to manufacture other products that are sufficiently different from those it was already manufacturing and whose production involves different production and distribution programs. Diversification comprises increases in the variety of end products, increases in vertical integration and increases in the number of basic production areas in which the firm operates.

According to Ruiz (2012), among the many theoretical perspectives that deal with and address the issue of diversification, the resource-based view, core capabilities or corporate coherence are the most appropriate for thinking about the strategies of large modern firms. The concept of productive base (PENROSE, 1959) seeks to explain how the firm diversifies by concentrating core competencies and capabilities that support production itself and which generally serve to produce more than one product.

The company is a collection of resources organized administratively and seeking to grow. The main capabilities involve technical know-how, reputation and brand recognition, as well as combinations of assets, people, cultural values and organizational processes. Resources are limited and underutilized, while diversification allows certain core competencies or capabilities to be strengthened or expanded (KIM; LEE; CHO, 2016) by bringing together complementary capabilities that exploit underutilized resources and allow production at lower costs and with greater value in the final product (ZAHAVI; LAVIE, 2013).

One of the central points of Edith Penrose's contribution is the recognition of limited and underutilized resources that can be expanded and productive capacity improved in an attempt to survive in a competitive environment. Due to the characteristics of the firm - which takes into account cultural and knowledge issues - resources are not changed in the short term, requiring time and becoming an innovation challenge in terms of both product and process. The set of capacities that a firm's production base finds, through organizational means, is just one way, among several, of managing its resources and carrying out a given production.

The firm, in turn, is always looking for internal expansion (of resources) and external expansion (into new markets), and depends directly on its ability to replicate, innovate and manage resources (RUIZ, 2012). For Penrose (1959), there are three motivations for a firm to diversify: (i) when its solid market position generates resources that exceed the investments needed to maintain its position, encouraging investment in new areas that are more promising; (ii) specific demand problems, such as permanent or

temporary fluctuations, where diversification can reduce the fluctuation in profits. A permanent decline may in turn reflect technological changes, new products and changes in consumer tastes, which is yet another factor in the firm's attempt to make the best use of its resources; (iii) entrepreneurial capacity and industrial research open up new possibilities for creating new uses for old resources, as well as technological innovation itself.

Diversification does not happen randomly. In addition to the capacity issues already mentioned, the firm as a locus of capital accumulation, that is, an agent in the face of the circumstances of the competitive environment in which it is inserted - market structures and competition patterns that influence the potential for accumulation and the rate of growth generated - is situated in a historical arrangement of resources with specific competitive advantages within a competitive environment (BRITTO, 1993; RUIZ, 2012). It is the production bases and commercial areas that define and limit the diversification growth horizon, where investments in areas far from those dominated by the firm become riskier. The union and intersection between production bases and commercial areas form an area of specialization, i.e. a skills zone.

There is therefore a focus mainly on areas of similar production and technology. The complexity presented by Hidalgo et al. (2007) elucidates this issue, showing that there is a network of goods that are more likely to be produced and therefore co-exported, which share techno-productive characteristics. The constraints on the firm's growth and diversification depend on its ability to replicate, innovate and manage in its area of specialization. Capacity tends to decrease the further away from the core business the investment is (PRAHALAD; HAMEL, 1990; DOSI; TEECE; WINTER, 1992).

It is worth pointing out the difference between growth and diversification: investments that only constitute a reaffirmation of the market through an increase in the stock of productive assets of the core business that expand and consolidate already existing capacities are growth investments; on the other hand, those that modify the scale of capital and especially its scope, with new products, new forms of production, customers and suppliers that add to the already existing capacities in bolder outlines, are considered diversification investments (RUIZ, 2012).

Thus, Camargo and Coutinho (2008) conceptualize four types of diversification:

1. Horizontal: new activities are related to the company's core business, with the aim of increasing economies of scope by using basically the same distribution and promotion channels, with less vulnerability to fluctuations in demand;

2. Vertical (integration): the firm, taking advantage of certain technological constraints, takes control of different stages of the production chain (both upstream and downstream), with gains from reducing the cost or even the transportation of material, improving economies of scale and scope. Although it creates barriers to entry for new producers, it makes the firm less flexible to market instabilities;

3. Concentric: exploiting the firm's core competencies by entering new markets other than the original ones. It requires a large financing capacity and a significant technological structure;

4. Conglomerate: progressive reduction of synergy between the company's activities, which can be induced by a very specific level of specialization and which involves, due to the disparity of activities, major managerial and operational limits that are reflected in the firm's business risks.

Digital platforms and their dominant position make it possible to use the income from tipping effects to finance expansion and diversification. As a high-tech market, its strategies must include maintaining the innovation lead, expanding service ecosystems that retain a significant share of demand and improving original capabilities.

4. Diversification on digital platforms

The practice of M&A in technology companies has become commonplace, especially in Big Tech. This term refers to large technology companies whose innovation is the constant driving force behind the redefinition of new goods and services - some of which are centuries old, such as Nokia, IBM and Toshiba. However, the term generally refers to the Big Five that originated in Silicon Valley: Apple, Microsoft, Amazon, Google (Alphabet) and Facebook (Meta).

The two firms that are the focus of this study concentrate their revenues substantially on digital platforms. Alphabet expects around 70% of its revenue to come from ads on platforms in 2019, with Google being the most used search engine on the planet (PICKERT, 2022). Meta, for its part, concentrates 98.5% of its revenue on its social network Facebook, expanding its operations into other areas from 2012 with the purchase of Instagram (PICKERT, 2022).

Digital platforms are under the influence of tipping effects, in other words, they tend to profit from their monopolistic position. Over the last two decades, this has been reflected in the offer of a variety of goods and services and a complex ecosystem for consumers. This justifies what Petit and Teece (2021) point out as "supplying nascent competition" via M&A, where some technology companies record a high number of these operations.

More recently, killer acquisitions have gained attention in the US market debate. It is not a new term or concept, in fact it derives from the observation of patterns in the pharmaceutical industry (CUNNINGHAM et al., 2020), which for the technology sector is put as a modality where large companies acquire small companies with high technological potential, hindering their innovation process by acquiring their expertise and know-how. According to Gawer (2020), it is difficult to determine ex-ante whether the acquisition of another firm is aimed at improving efficiency or neutralizing a possible competitor,

requiring academics, regulators and political authorities to carry out a more in-depth analysis in order to guarantee competition in the market.

In an important empirical study observing the acquisition of 175 companies between 2015 and 2017, the work of Gautier and Lamesch (2020) points out that the Big Five's main target for acquisition are young and small companies, around 4 years old, with particular emphasis on Google and Facebook. What is striking is that most of these acquisitions do not survive and the original product disappears, and neither do they pass the necessary scrutiny of the antitrust authorities.

This type of operation generates controversy both in terms of its social and innovative impact and in terms of the position of the regulatory authorities. The emergence of technological markets with the creation of valuable assets and control over the storage and manipulation of data - within the digital context of dynamic and interconnected ecosystems - could cause profound changes in the course of industrial evolution.

The big five are looking to acquire small companies - many of them startups - in order to expand and maintain their control of the market. The case of Facebook's acquisition of Instagram is notorious, as it was bought for twice the market value at the time[5], which exemplifies the extent to which large firms are willing to spend in an M&A process to strengthen their market position. In response, the US Congress recommended to the antitrust authorities that Big Techs should not control or compete in related businesses, so that there is no concentration or dominance of niches. Both Facebook and Google have already been sued for competition violations (RAHMAN, 2020).

The reading of social damage is diverse. Some authors point out that this type of action can generate inefficiencies, since the target of large firms are small companies with products and positions that can be a competitive threat (CUNNINGHAM et al., 2020). The prospect of being acquired by a dominant firm discourages investors from investing venture capital in killer acquisition zones, according to Kamepalli et al. (2020). The "killer acquisition" can also generate two types of events: the discouragement of alternative and more efficient M&A and the preference, on the part of the founders and owners of small firms, for a short-term exit from the market rather than maintaining a more lasting trajectory of autonomous growth due to the high values offered by the large, established and dominant firms (LEMLEY; MCCREARY, 2020; PETIT, 2020; PARKER et al., 2020).

For Petit and Teece (2021), although the harmfulness of Facebook's purchase of Instagram seems obvious today, a decade ago there was no institutional preparation or theoretical understanding for it. The authors argue that the framework that assesses potential competition should do so through the lens of capabilities, recovering the basic principles of expansion and growth of the Penrosean firm.

Ironically, as Rahman (2020) points out, advocates against regulations argue that this would inhibit innovation, justifying their behavior on the basis of their contribution to the economy and society - as companies fundamental to the control and disposal of data - as well as the flow of investment in R&D proven in patent generations. In addition to what has already been said, they ignore the fact that in the real world, the technology giants have advantages on an incomparable scale that are difficult for an entrant firm to compete with,

while the established dominant firms not only have a complete ecosystem of goods and services, but also the technological and economic conditions to maintain themselves in scenarios of adversity that are much greater than those of the entrants. Older technology companies, such as Nokia, have not reached the level of horizontal and vertical integration of today's tech giants that dominate the global market with actions beyond the flow of investment in innovation, involving strategies that prioritize growth for profit rather than focusing on price or technology results.

Furthermore, Petit and Teece (2021) state that dynamic structures make some classes of acquisitions less problematic. Three basic rules are observed in the literature: the first is counterintuitive, the greater the degree of alignment between the merging firms, the greater the scope for efficiencies to rescue an anti-competitive merger, since the absorption of successful dynamic capabilities is more important for firms that have already developed a path of learning than for those that have already closed that path; a second rule is the absorption of the acquired capabilities, which is easier in younger companies - older ones have ingrained routines that are difficult to pass on; the third rule refers to the risk of acquisition, which is lower when the firm is a nascent start-up with reduced chances of survival in concentrated markets.

The main motivation behind digital platform M&As is the increase in market concentration and the consequent reduction in competition, which often results in horizontal M&As. The virtual ecosystems of goods and services require control of the data markets, which are increasingly essential for the operation of dominant firms. On the other hand, as they are tipping effects markets, the current dominant players have already gone through the competition stage with other possible motivations for M&A, such as operational and managerial synergies for greater effort in research and development, use of the same inputs and transfer of technology and knowledge.

5. The case of Google and Alphabet.

Google was born in 1998 as a doctoral research project by Larry Page and Sergey Brin when they were studying at Stanford. Until then, search engines returned results by counting the number of times a given term appeared on the first page. The approach of the two founders' work at Stanford University proposes PageRank, an algorithm that measures the importance and relevance of a site by the quantity and quality of links pointing to it (BRIN; PAGE, 1998).

Google's core capabilities and resources are internet search tools, to the point where the founders wrote a dissertation on the mathematical properties of the World Wide Web, created in the CERN laboratories in the early 1990s by Tim Berners-Lee and Robert Cailliau, revolutionizing the interaction of networked computers on a global scale (MOWERY; SIMCOE, 2002). The Stanford students dedicated their paper "The Anatomy of a Large-Scale Hypertextual Web Search Engine" (1998) to describing the technical properties of a search engine capable of crawling the entire web and listing pages based on relevance.

Even before it was called Google, the founders created the BackRub search engine to use PageRank algorithms. The term Googol - a binary combination of 1 followed by 0 a hundred times - would later be adopted and would remain on the servers of Stanford University itself[6], only to be registered in September 1997 as Google.com. The $100,000 funding raised in 1998 by Andy Bechtolsheim, co-founder of Sun Microsystems, would be the starting point for the company which, in the late 1990s and early 2000s, would move headquarters several times until it occupied its final address at 1600 Amphitheatre Parkway in Mountain View, California (SFGATE, 2004).

The emergence of Google took place in the context of the explosion of dot com firms, a series of digital companies that took advantage of the emergence of the Internet in the early 1990s as an opportunity to exploit various businesses, from the first browsers, such as Netscape (1994), e-commerce such as Amazon (1994), to portals such as Yahoo (1994) (MOWERY; SIMCOE, 2002; TIGRE; NORONHA, 2013). These firms benefited from the broad post-war US national innovation system, which involved public and private actors, governments and universities in the creation and establishment of technologies and protocols[7] that were fundamental to the digital turn of the late 20th century.

In this explosion of internet companies, the value of assets on the Nasdaq - the world's main index of technology companies - reached its peak, the famous dot com bubble. Between 1990 and the bursting of the bubble in the early 2000s, there was a financial market frenzy that peaked at over 5,000 points on the Nasdaq Composite (NASDAQ COMPOSITE, 2022). With the internet crisis, several firms went bankrupt or disappeared as financial assets were redirected towards safer investments, such as real estate (TORRES FILHO, 2015).

One of the company's main growth paths was acquisition. Between 2001 and 2006 (table 2) Google acquired more than 26 companies, mostly technology start-ups (SEKERLI; AKÇETIN, 2018; CRUNCHBASE, 2022). Although many of these acquisitions were not in its initial area of operation, the strategy allowed it to enter new areas and markets, being one of the first to experiment with the advertising model in its business with publishing services such as AdWords and AdSense. Although its basic product is online search - which has made the company globally famous - the expansion has involved different internet goods and services, such as tools like gmail and Google Drive, business products like Google Search Appliance and other services like Google News, Google Translate, Google Maps etc. (SEKERLI & AKÇETIN, 2018; CRUNCHBASE, 2022).

The AdWords case is an important turning point in the company's history. Suffering from the crisis of the 2000s, there was the fear of becoming just another case in the wave of dot coms that failed to find profitable business opportunities. Converting the entire internet as an advertising medium into targeted ads would be the solution that would require newly discovered skills, such as data extraction and analysis (ZUBOFF, 2019), making extensive use of semantic analysis and artificial intelligence, which was booming at the time. Only by using these technologies would Google be able to accurately evaluate the content of a page and how users interact. The set of methods patented by Google would

be called AdSense, which in 2010 would produce annual revenues of more than $10 billion by combining an unprecedented mix of behavioral surplus, data science, computing power, algorithmic systems and automated platforms (ZUBOFF, 2019).

In two decades, Google has made its presence felt in cell phones, smartphones, computers, operating systems, online translation, browsers, music, movies, cloud internet, among other things. The more than 96 products offered by the company are focused on search engine technologies, advertising, e-commerce and mobile software development. Advertising plays an important role in the company, accounting for 88% of its revenue in 2016 (SEKERLI; AKÇETIN, 2018). In the US Securities and Exchange Commission (SEC, 2017) report, the company states its intention to generate advertising revenue through its platforms. Google's total revenue was $78.532 million in the third quarter of 2017, while advertising revenue was $68.148 million.

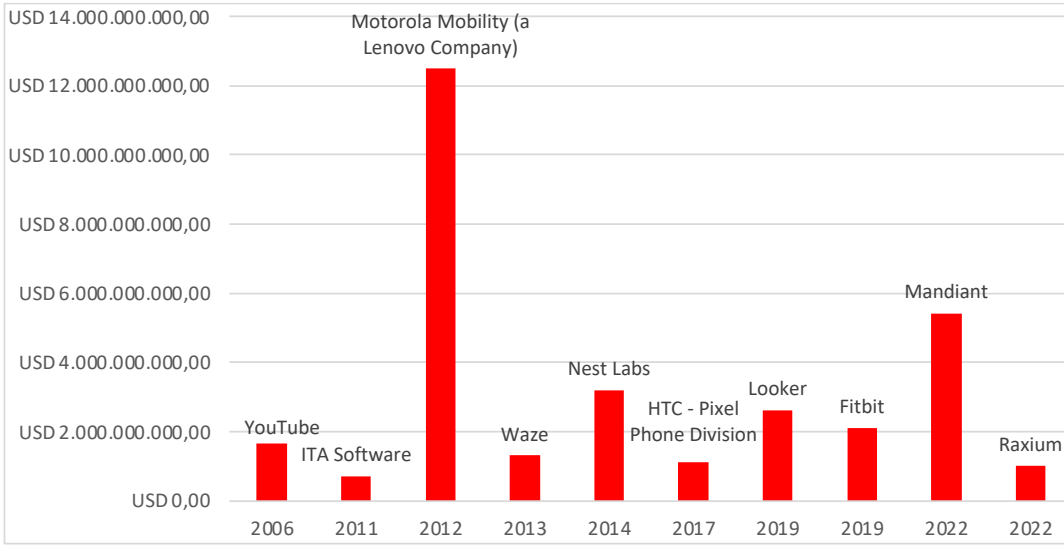
Table 2: Google's main acquisitions (2001-2017)

2001	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2017
2	6	5	9	9	14	3	7	26	25	10	20	33	7	1

Source: Own elaboration based on Sekerli and Akçetin (2018).

The first diversifications sought to offer a whole ecosystem of correlated and complementary services, such as access via a universal email (gmail), in a movement of domination and vertical integration where the company controls everything from the search tools to the email box and the browser itself, passing through the AdSense advertising program and reaching the electronics sectors. At the same time, M&A was a great strategy for entering new markets and improving those that Google already operated in, such as the $1.65 billion stock deal to acquire YouTube in 2006 or the purchase of SkyBox Imaging in June 2014 for $500 million to obtain satellite technology and improve the accuracy of Google maps (PINEDA, 2021).

Graph 1: Values of Google's top 10 acquisitions (in billions of dollars)



Source: Own elaboration based on Crunchbase (2022).

One of the most important acquisitions of the period was the Android operating system (OS) for US$20 million in 2005, firmly introducing the company to the smartphone and tablet market and competing alongside operating systems such as Apple's iOS, extending its services to the electronics and mobile user market. With an open source system, Android is currently the most widely used OS in the world and is the standard system for Samsung, LG, Nokia and Motorola devices, in addition to Google's own devices (PINEDA, 2021).

Graph 1 shows the values of the company's top ten acquisitions in billions of dollars. A significant part of these acquisitions are outside the company's original market - search engines and advertising. According to Harrison, Google's manager, expansion is happening as a response to the environment (GRIFFITH, 2017), so it's not surprising that the company is increasingly moving towards Industry 4.0 technologies. Based on its Android ecosystem, it is looking for smarter objects based on the Internet of Things, connecting homes, lighting, equipment and transportation. The advancement of facial and voice recognition is also an area of expansion for sectors such as banking, automobiles and home electronics (Google I/O 2016 - Keynote, 2016).

Table 1 shows this movement more clearly. Of the company's fifty[8] major M&As, only 6 are in advertising, with acquisitions made in the second half of the 2000s and early 2010s. The 15 operations related to emerging Industry 4.0 technologies were carried out in the 2010s in areas such as artificial intelligence, sensors and the smart home, big data, cloud computing and augmented reality. The diversity of acquisitions is evidenced by the number of operations in other groups, such as software and e-commerce, with 29 operations. When

looking at the value of the acquisitions (graph 1), 4 of the largest are emerging technologies: Mandiant, Nest labs, Looker and Raxium. None of the ten are in the advertising group.

The purchase of Nest (2014) aims to overcome the difficulties in producing smart technologies, designing user-focused technologies for thermostats and smoke detectors in the domestic environment, with a technological aggregation role in the Internet of Things, incorporating know-how for other company projects. Here again, the risk of M&A for innovation, which may discourage investments in areas where the process of killers acquisition is dominant, is aggravated in this case by the fact that industry 4.0 technologies have been developed in the last thirty years (BRIXNER et al., 2019), impacting a possibly greater scenario of competition and capabilities via concentration. On the other hand, Google claims that non-ad revenue, such as from the use of Google Cloud, Google Play and hardware sales, has increased in recent years, encouraging intensive investment in R&D to serve users in different markets and expand existing businesses. Even so, in this strategy, M&A remains the business rule (SEKERLI; AKÇETIN, 2018).

To manage the different products and markets, so far removed from the company's original activities, Alphabet was founded at the end of 2015, with the following main subsidiaries: Google (internet technology), Calico (genetics), Google X (research and development), Google Ventures (investment in startups), Google Capital (investment in companies), Fiber (fiber optic connection) and Nest (home electronics).

The company's main plans for the second half of the decade include the three drivers of Industry 4.0: physical, digital and biological[9] (SCHWAB, 2016). The firm not only recognizes the importance of mastering capabilities related to cloud data, artificial intelligence and machine learning, but is already taking action in this direction, with the launch of Visual Inspection AI that uses Google Cloud computer vision to automate the quality control process, allowing defects to be detected before the product is sent to sales (CIMM, 2021).

The Google Cloud computing suite, launched in 2008 by the company, plays a leading role in the move towards emerging technologies, operating in the same basic ecosystem that provides services such as the Google search engine and the Youtube video platform, with services that go beyond data storage, such as machine learning and artificial intelligence (GOOGLE I/O 2017-KEYNOTE, 2017). The capabilities and resources of an internet search engine help you filter data and information and use the best algorithms. Alphabet already has partnerships with companies such as Siemens and Renault to optimize factory floor processes and accelerate corporate digitalization.

In short, Google initially expanded horizontally around its core business, increasing its economy of scope, using the same distribution and promotion channels due to its initial financial limitations. With the end of the Internet bubble in the mid-2000s and the IPO in August 2004, M&A operations increased significantly, in a vertical expansion (integration) movement focused on creating an entire interrelated and interdependent ecosystem, operating from browsers to message boxes. From 2010 onwards, the volume and speed of acquisitions increased for new markets in non-similar products and services that present some kind of synergy - acquiring companies such as Nest Labs, marking its

entry into home automation and the strategy of dominating the technologies and capabilities of manufacturing 4.0.

With the killers acquisitions it was possible to incorporate know-how and R&D, increasing its market power to such an extent that it caught the attention of the American authorities. Actions like these can generate inefficient innovations, i.e. the unnecessary repetition of innovative efforts or resources, and even discourage investments in the "killer acquisition" areas that could result in more appropriate M&A in terms of market structure. Even so, Google is at the top of the Big Techs in terms of R&D spending, having spent $16 billion dollars in absolute terms in 2017, around 15% of total sales (CBINSIGTHS, 2017).

Table 1: Google's top 50 M&As, by group

Google M&A	Advertising	Emerging Technologies	Others	Total
	6	15	29	50

Source: Own elaboration based on Crunchbase (2022).

With a large part of its revenue coming from advertising, the digital platform operates in all three segments recognized by CADE (2021) - subscription model, advertising model and open access model - combining and recombining the three business models, even though the largest share of revenue is in the advertising area, and diversification, in this sense, also operates as a way of exploring new sources of revenue in the three main activities of a digital platform: search engine, social media and content aggregator.

As a platform, Google has strengthened its power and dominance over the last two decades, taking advantage of the financial gains of its privileged position to gradually expand into sectors further away from its core activities that originated when it was founded in the late 1990s. Currently, Alphabet is interested in a wide range of technologies, from cloud computing and artificial intelligence to biotechnology, which can be seen in its patent efforts in voice recognition and machine learning (CBINSIGTHS, 2017) and in its numerous M&As over the last decade. All of this reinforces the company's central role as a major technology player and a highly capillarized company able to enter and dominate other markets.

6. The Facebook and Meta case

Unlike Google, the social network The Facebook emerged after the Internet bubble burst in early February 2004, created by Mark Zuckerberg, Eduardo Saverin, Chris Hughes and Dustin Moskovitz as a joke among Harvard University students, programming a tool that showed two photos side by side where you could choose the more attractive one (in

the US the game became known as "hot or not"). At the time, the platform was known as Facemash and was designed exclusively for the university's students, but it was short-lived (SCHWARTZ, 2003; ZEEVI, 2013).

In January 2004, Zuckerberg began to define a code that would comply with Harvard's security and privacy rules. A month later, The Facebook was launched, and immediately became a media sensation due to accusations from the college of privacy violations. The following year the domain was simplified to Facebook, allowing access to more than 800 higher education institutions, including high schools (ARRINGTON, 2005).

In 2006, two expansions were key for the company: allowing access to more than 22,000 commercial organizations and the definitive extension of access to any Internet user with a minimum age of 13 and a valid e-mail address. Available in more than 70 languages, around 80% of the platform's users are outside the US (CORREIA; MOREIRA, 2014) and, although initially aimed at a university audience, in 2010 it recorded the biggest growth in users over the age of 34, representing 28% of total users at that time (FLETCHER, 2010). At its peak in 2016, the social network had around 2 billion active users. Before its IPO, which took place in May 2012, Peter Thiel, Greylock Partners and Meritech Capital Partners invested US$25 million in April 2006, and giant Microsoft bought 1.6% of the site for US$240 million at the end of 2007 - an indication of the potential in the recent technology company (TELLER, 2006; CRUNCHBASE, 2022).

The core competencies and capabilities were focused on social networks, based on their popularity and presence in student institutions. In general, the platform offers simple social interactions via public bulletin boards, messaging with private dialogs and a homepage that provides all the specific information related to the user in real time (CORREIA; MOREIRA, 2014). When it first appeared, Facebook had competition from other social networks such as Orkut (2004), owned by Google and shut down in 2014, and Myspace (2003), owned by communications conglomerate NewsCorp.

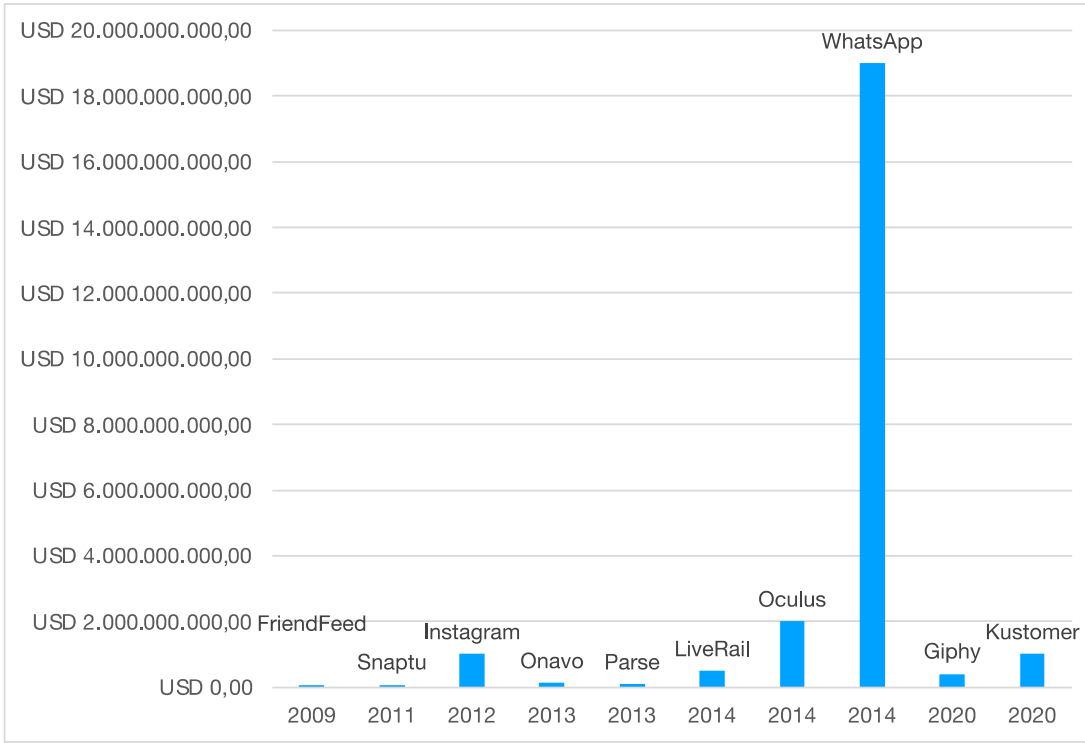
Facebook's dominance involved not only a friendly and highly interactive social tool, but also a savvy advertising and commercial exploitation that began with plans to add classifieds to its platform. Currently, Face Ads, a paid advertising system, is responsible for more than 95% of the company's revenue (PICKERT, 2022). Targeting ads by location, age, gender and users' particular interests has proved to be a commercial and advertising success. In 2021, the company's total revenues amounted to US$29 billion between July and September, an increase of 35%, with advertising revenues accounting for US$28.27 billion of this total (PEREIRA, 2021).

At the end of the second half of the 2000s, Facebook made a series of acquisitions, but none of them were large or substantially deviated from its original activities. Among the highlights was the purchase of Chai Labs in 2010 for US$10 million, with the aim of accelerating the flow of advertising revenue by betting on the company's specialized workforce (HALLMAN, 2020). To avoid intellectual property violations and take advantage of existing patents related to social networks, Facebook paid around 40 million for a set of Friendster patents (HALLMAN, 2020).

With a view to expanding into mobile advertising, three acquisitions stand out in the early 2010s: SnapTu, an Israeli developer acquired in a deal worth around US$70 million to deploy Facebook's mobile app; rel8tion, which gave access to hyper-local advertising, improving the user experience via location; and Beluga, which provided highly qualified ex-employees of a slightly older company - Google (DOLATA, 2017; HALLMAN, 2020). But it would be in 2012 that Facebook would put the world's regulatory authorities on alert with its biggest acquisition to date: Instagram, the photo-sharing social network, bought for $1 billion dollars, operating under its own brand and with a stand-alone app (DOLATA, 2017; HALLMAN, 2020).

Between 2019 and 2020, in a series of antitrust investigations in the technology sector at the Subcommittee on antitrust, commercial and administrative law of The House of Representatives (2020), internal Facebook emails were discovered that, in the company's understanding, the acquisition of Instagram was not just a functional complement in terms of a photo filter, but a direct competitor in terms of social networks, thus being able to neutralize a potential competitor while complementing tools in its existing network.

Graph 2: Values of Facebook's top 10 acquisitions (in billions of dollars)



Source: Elaborated by the author based on Crunchbase (2022).

Here, it's worth noting an important difference between Facebook and Google in terms of advertising: the first company, in general, works in the intermediation of visual ads (photography, sponsored posts and videos) while the second company has a broader scope and, in fact, a more complex ecosystem based on its original search tool that has gained immense capillarity in the most diverse types of electronic devices and online tools (MOTTA, 2021). From a global perspective, according to Haucap and Heimeshoff (2014), although Facebook is by far the leader in the market in which it operates, its presence is not as dominant as Google's in many countries around the world, with social networks showing strong fluctuations in users when compared to a search engine, for example.

This is corroborated in Graph 2, which lists Facebook's top 10 acquisitions. Unlike Google, the company has a smaller volume of funds earmarked for M&A. Among its top ten acquisitions, only four exceed the billion mark, two of which are emerging technologies. As we can see in table 2, among the top fifty M&A transactions, only two are related to advertising: LiveRail[10], acquired for half a billion dollars, and Push Pop Press. Of the emerging technologies, 5 operations were carried out between 2011 and 2014 and 9 operations between 2015 and 2022 for technologies such as artificial intelligence, augmented reality and cloud computing.

In January 2014, Facebook carried out the biggest M&A in its history, buying WhatsApp, a free instant messaging app, further consolidating its presence in interactive networks. But it would be another acquisition in the same year that would begin to show signs of a strategy for other markets. In March 2014, Facebook acquired Oculus VR, one of the company's major forays into a market far removed from its original one, with exploitation beyond advertising revenue, with a subsidiary that produces electronic devices. In partnership with Samsung, Facebook is launching the Samsung Gear VR for Galaxy smartphones (TWSJ, 2015). By buying pebbles - a developer of motion capture software and hardware - it is strengthening its interest in augmented, virtual and mixed reality[11] (DOLATA, 2017; HALLMAN, 2020).

Table 2: Facebook's top 50 M&As, by group

M&A Facebook	Advertising	Emerging Technologies	Others	Total
	2	14	34	50

Source: Elaborated by the author based on Crunchbase (2022).

Also in 2014, the company signaled its interest in autonomous vehicles, two days after buying Oculus, acquiring Ascenta, which specializes in the design of high-altitude unmanned vehicles (drones), for $20 million. In terms of Industry 4.0, Facebook's main focus is augmented, mixed and virtual reality, developing software and hardware for these technologies, but without ignoring markets such as autonomous vehicles (DOLATA, 2017; HALLMAN, 2020). On October 28, 2021, Mark Zuckerberg announced the change of

name of the parent company of his companies to Meta, in reference to the metaverse. A broad concept that first appeared in Neal Stephenson's 1992 fictional book Snow Cash, it refers, at least in Zuckerberg's case, to the firm that will manage the other subsidiaries, including Facebook, aiming for virtual interaction via avatars in a broad digital universe that includes currencies and accessories.

The firm consolidated its advertising operations while remaining at the forefront of social networks. The way in which users are disseminated and tracked, combined with the cross-referencing of data and information that justified Facebook's success, put the company in a unique position of not only advertising control, but also the manipulation of personal data. By bringing people, companies and advertisements together, it brings offline areas of interest closer to the online world (AMANTE, 2014). By moving on to activities far removed from its initial business, it is moving towards 4.0 technologies using part of its original social interaction know-how.

7. Conclusion

Table 3 is a summary of the firms discussed so far. In the typification of digital platforms, Google operates substantially as a search engine while Facebook was born as a social network. Both intersperse the three most common types of business model: subscription, advertising and open access, with most of their revenue coming from ads. As tipping effects, they took advantage of their dominant market positions to carry out the type of M&A known as killer acquisitions, neutralizing potential competitors while adding new capabilities.

Table 3: Summary of the companies analyzed

Company	Original skills	Core Business	Expansion
Google	Search tools	Ads	Media Mobile software and hardware Social networks Internet of Things Artificial Intelligence Big data
Facebook	Social network	Ads	Media Software Big data Augmented, virtual and mixed reality Autonomous vehicles

Source: Elaborated by the author based on Dolata (2017) and Crunchbase (2022).

Diversification at the outset takes place horizontally, leveraging its core business and broadening its scope using basically the same promotion mechanisms. Over time, both Google and Facebook took advantage of technological constraints to take control of different stages of the production chain, creating complex ecosystems in a vertical diversification of integration. This move ends up reinforcing the participation of both firms in their original competencies, while strengthening their market positions. From 2010 onwards, there was a concentric incursion, exploring core competencies to enter new markets different from the original ones - in Google's case, markets and technologies involving the internet of things, big data and artificial intelligence; Facebook, meanwhile, expressed interest in the areas of augmented, virtual and mixed reality and autonomous vehicles. It cannot be categorically stated that horizontal and vertical diversification will be abandoned in any substantive way, since companies are still very dependent on advertising segments to generate their revenues.

Expanding into Industry 4.0 technology markets requires technological capacity and large amounts of funding, which is made possible by the position they maintain in their original markets and enables concentric diversification. It is consistent with its core capabilities, with Google becoming a subsidiary of Alphabet, which takes advantage of the original search activities, intelligent algorithms and a broad ecosystem to advance in branches such as artificial intelligence and the internet of things; the same is true of Facebook, using its know-how to found meta and scale social relationships to new technological levels.

The expansion of platforms in terms of markets and products is also reflected in new sources of revenue that are not linked to advertisements. They also share a common characteristic in the importance of controlling and manipulating data and information in the economic and social configuration of recent technologies. This work opens up possibilities for further research into diversification into Industry 4.0 technologies, as well as the impacts in terms of market structure that firms of this size and with these actions have on the global competitive landscape. In addition to competitive issues, future work could also address the relationship between these large companies and the pervasive nature of emerging technologies.

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Appendices

The database used to compile the list of the fifty main M&As of Google/Alphabet (2003-2022) and Facebook (2009-2022) was crunchbase, which is widely used in international literature. Due to the large number of transactions and considering the objective of the work, the exhibition does not look at all mergers and acquisitions, but at the most significant ones from the point of view of expenditure and the scope of the target firm. Fifty M&A transactions are listed, in ascending order of the date announced, with the following information: acquiree name, announced date, price currency (in USD), acquiree industries and groups. The latter is based on a reflection of the technical, non-technical and socio-technical elements of the digital platform market shown in section 2, divided into the core activities of companies, advertising and publicity; emerging technologies related to industry 4.0; and other acquisitions.

Google

Acquiree Name	Announced Date	Price Currency (in USD)	Acquiree Industries	Groups
Applied Semantics	2003	102.000.000,00	Developer APIs, Enterprise Software, Mobile Apps, Software	Others
Android	2005	50.000.000,00	Linux, Mobile, Search Engine, Software	Others
dMarc Broadcasting	2006	102.000.000,00	Advertising, Advertising Platforms, Broadcasting, Internet Radio, Marketing, Music	Advertising
YouTube	2006	1.650.000.000,00	Internet, Music, Video	Others
Endoxon	2006	28.000.000,00	Information Technology	Others

Adscape	2007	23.000.000,00	Advertising, Digital Media, Marketing	Advertising
FeedBurner	2007	100.000.000,00	Blogging Platforms, Digital Entertainment, Insurance, Internet, Podcast	Others
PeakStream	2007	20.300.000,00	Apps, Developer APIs, GPU, Software	Others
GrandCentral	2007	60.000.000,00	Mobile, Telecommunications, VoIP	Others
Jaiku	2007	12.000.000,00	Mobile	Outras
ZAO Begun	2008	140.000.000,00	Ad Network, Advertising	Advertising
On2 Technologies	2009	130.000.000,00	Content, Internet, Software, Video	Others
Gizmofive	2009	30.000.000,00	Public Relations, VoIP	Others
Invite Media	2010	81.000.000,00	Advertising, Information Technology, Media and Entertainment	Advertising
Slide	2010	182.000.000,00	Developer Tools, Internet, Photography, Public Relations, Social Media, Software	Others
MentorWave Technologies	2010	12.000.000,00	Software	Others
Widevine Technologies	2010	160.000.000,00	Digital Entertainment, Digital Media, Music, Software, Video	Others
BeatThatQuote.com	2011	61.208.154,00	Auto Insurance, E-Commerce, Price Comparison	Others
ITA Software	2011	700.000.000,00	Information Technology, Online Auctions, Software, Travel	Others
modu	2011	4.900.000,00	Mobile, Telecommunications, Wireless	Others
Admeld	2011	411.556.083,00	Advertising, Auctions, E-Commerce	Advertising

Zagat	2011	151.000.000,00	Consumer Reviews, Local, Publishing, Restaurants	Others
Meebo	2012	100.000.000,00	Internet, Messaging, Web Development	Others
Wildfire	2012	350.000.000,00	Advertising, Analytics, Enterprise Software, SaaS, Social Media, Software	Advertising
Motorola Mobility	2012	12.500.000.000,00	Mobile, Mobile Devices, Telecommunications	Others
BufferBox	2012	17.000.000,00	E-Commerce, Internet, Shopping, Transportation	Others
Wavii	2013	30.000.000,00	Analytics, Mobile Apps, Natural Language Processing	Emerging Technologies
Waze	2013	1.300.000.000,00	Mobile Apps, Navigation, Transportation	Others
Bump Technologies	2013	30.000.000,00	Apps, Mobile, Wireless	Others
FlexyCore	2013	23.000.000,00	Software	Others
Schaft	2013	20.000.000,00	Hardware, Robotics, Software	Emerging Technologies
Nest Labs	2014	3.200.000.000,00	Manufacturing, Sensor, Smart Home	Emerging Technologies
DeepMind	2014	500.000.000,00	Artificial Intelligence, Business Development, Machine Learning	Emerging Technologies
Divide	2014	120.000.000,00	Enterprise Software, Information Technology, Mobile, SaaS, Software	Emerging Technologies
Terra Bella	2014	500.000.000,00	Analytics, Big Data, Information Services, Video	Emerging Technologies
Oyster	2015	30.000.000,00	E-Commerce, E-Learning, EBooks, Education, Internet, Reading Apps	Others

Bebop	2015	380.200.000,00	Business Development, Enterprise, Enterprise Software	Others
Apigee	2016	625.000.000,00	Cloud Data Services, Enterprise Software, Information Technology, Internet, Software	Emerging Technologies
HTC - Pixel Phone Division	2017	1.100.000.000,00	Consumer Electronics, Mobile	Others
Xively	2018	50.000.000,00	Clean Energy, Enterprise Software, Internet of Things, SaaS	Emerging Technologies
Looker	2019	2.600.000.000,00	Analytics, Business Intelligence, Data Visualization, Enterprise Software	Emerging Technologies
Fitbit	2019	2.100.000.000,00	Apps, Fitness, Health Care, Personal Health, Wearables	Others
Pointy	2020	163.000.000,00	E-Commerce, Internet, Software, Technical Support, Web Design, Wireless	Others
North	2020	180.000.000,00	Consumer Electronics, Consumer Goods, Eyewear, Google Glass, Robotics, Wearables	Emerging Technologies
Siemplify	2022	500.000.000,00	Cyber Security, Network Security, Security, Software	Emerging Technologies
Mandiant	2022	5.400.000.000,00	Information Technology, Network Security, Security	Emerging Technologies
Raxium	2022	1.000.000.000,00	Augmented Reality, Hardware, Information Technology	Emerging Technologies
BrightBytes	2022	100.000,00	Analytics, Big Data, Education, SaaS	Emerging Technologies
Alter	2022	100.000.000,00	3D Technology, Apps, Artificial Intelligence, Computer Vision, Social Media, Virtual Goods	Emerging Technologies

Facebook

Acquiree Name	Announced Date	Price Currency (in USD)	Acquiree Industries	Sector
FriendFeed	2009	USD 50.000.000,00	Media and Entertainment, News, Social, Social Media	Others
Divvyshot	2010		Photo Sharing, Social Network, Web Hosting	Others
Hot Potato	2010	USD 10.000.000,00	Social, Social Media, Social Media Marketing	Others
Chai Labs	2010	USD 10.000.000,00	Internet, Software, Web Browsers	Others
Nextstop	2010	USD 2.500.000,00	Digital Entertainment, Leisure, Location Based Services, Social, Travel	Others
Snaptu	2011	USD 70.000.000,00	Digital Entertainment, Internet, Mobile	Others
Daytum	2011		Analytics, Big Data, Database	Emerging Technologies
Sofa	2011		Computer, Developer Tools, Product Design, Software	Others
Push Pop Press	2011		Advertising, Digital Media, Marketing	Advertising
Digital Staircase	2011		Software	Others
Gowalla	2011	USD 3.000.000,00	Location Based Services, Photography,	Others

			Private Social Networking, Travel	
Instagram	2012	USD 1.010.470.000,00	Mobile, Photo Sharing, Photography, Social Media	Others
Tagtile	2012		Direct Marketing, Loyalty Programs, Mobile, Social Media	Others
Glancee	2012		Android, Dating, iOS, Location Based Services, Mobile, Public Relations, Search Engine	Others
Face.com	2012		Artificial Intelligence, Cloud Storage, Facial Recognition, Machine Learning, Photography, Social Network	Emerging Technologies
Hot Studio	2013		Internet, Social Media, Web Design	Others
Parse	2013	USD 85.000.000,00	Android, Cloud Computing, Enterprise Software, iOS, Mobile, PaaS, Software	Emerging Technologies
Onavo	2013	USD 120.000.000,00	Finance, Mobile, Social Network	Others
SportStream	2013		Consumer Electronics, Mobile, Sports	Others

Branch	2014	USD 15.000.000,00	Internet, Messaging, Social	Others
WhatsApp	2014	USD 19.000.000.000,00	Android, Messaging, Mobile, Subscription Service	Others
Oculus	2014	USD 2.000.000.000,00	Augmented Reality, Consumer Electronics, Hardware, Video Games, Virtual Reality, Virtualization	Emerging Technologies
Ascenta	2014	USD 20.000.000,00	Aerospace	Emerging Technologies
ProtoGeo	2014		Information Services, Information Technology, Mobile	Others
Moves	2014		Fitness, Mobile Apps	Others
Little Eye Labs	2014		Android, Mobile, Software, Test and Measurement	Others
LiveRail	2014	USD 500.000.000,00	Advertising, Analytics, Enterprise Software, Video	Advertising
Wit.ai	2015		Artificial Intelligence, Computer, Developer APIs, Machine Learning, Software	Emerging technologies
QuickFire Networks	2015		Cloud Data Services, Video	Emerging technologies

Masquerade	2016		Consumer Applications, Mobile, Photo Editing, Software	Others
Two Big Ears Ltd	2016		Audio, Consumer Electronics, Software, Virtual Reality	Emerging Technologies
Eyegroove	2016		Mobile, Music, Social Media, Video	Others
Nascent Objects Inc	2016		Manufacturing, Product Design, Software	Others
CrowdTangle	2016		Brand Marketing, Non Profit, Social Media	Others
Source3	2017		3D Printing, Content, Content Creators, Intellectual Property, Software	Emerging Technologies
tbh	2017		iOS, Mobile Apps, Social, Social Media	Others
RedKix	2018		Collaboration, Email, Enterprise Software, Messaging	Others
Refdash	2018		Education, Recruiting	Others
Scape Technologies	2020		Augmented Reality, Computer Vision, Software	Emerging Technologies
Giphy	2020	USD 400.000.000,00	Communities, Internet, Photo Sharing,	Others

			Publishing, Search Engine, Social Media	
Mapillary	2020		Artificial Intelligence, Geospatial, Image Recognition, Mapping Services, Mobile, Photography	Emerging Technologies
Lemnis Technologies	2020		Augmented Reality, Computer Vision, Consumer Electronics, Enterprise Applications, Software, Virtual Reality	Emerging Technologies
Kustomer	2020	USD 1.000.000.000,00	CRM, Customer Service, Enterprise, SaaS, Small and Medium Businesses, Software	Emerging Technologies
ImagineOptix	2021		Developer Platform, Enterprise Software, Manufacturing	
presize.ai	2022		3D Technology, Artificial Intelligence, Computer Vision, E-Commerce, Machine Learning, Retail	Emerging Technologies

		Technology, Software	
Lofelt	2022	Consumer Electronics, Hardware	Others
Twisted Pixel Games	2022	Creative Agency, Online Games, Video Games	Others
Armature Studio	2022	Software, Video Games	Others
Camouflaj	2022	Computer, Video Games	Others