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Green Mergers and Acquisitions: a study case of China's Gezhouba Group

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Sommario

Le Fusioni e acquisizioni verdi rappresentano uno strumento strategico utilizzato dalle aziende per affrontare le sfide legate alla sostenibilità globale e favorire una transizione più rapida verso modelli di business maggiormente sostenibili. Questo elaborato analizza tali pratiche green, considerando sia una prospettiva generale che un focus specifico sul contesto cinese, evidenziando come esse non solo rispondano alle crescenti pressioni normative imposte dai governi e agli obiettivi climatici, ma si configurino anche come un'opportunità per le aziende di migliorare la propria posizione sul mercato, il proprio brand, e di accedere a nuove tecnologie pulite e nuovi mercati. I risultati ottenuti mostrano come queste strategie non solo contribuiscano a ridurre l'impatto ambientale delle aziende, ma rappresentino una leva strategica per rispondere alle sfide poste dalla transizione ecologica, creando valore sia per le aziende e sia per la società. Tuttavia, queste operazioni richiedono un'attenta gestione dei rischi ed un'analisi al fine di prevenire comportamenti opportunistici, come il greenwashing.

Abstract

Green mergers and acquisitions are a strategic tool used by companies to address global sustainability challenges and foster a faster transition towards more sustainable business models.
This study analyzes these green practices, considering both a general perspective and a specific focus on the Chinese context, highlighting how they not only respond to the growing regulatory pressures imposed by governments and climate objectives, but also represent an opportunity for companies to improve their market position, their brand, and to access new clean technologies and new markets. The results obtained show how these strategies not only contribute to reducing the environmental impact of companies but represent a strategic lever to respond to the challenges posed by the ecological transition, creating value for both companies and society. However, these operations require careful risk

management and analysis in order to prevent opportunistic behaviors, such as greenwashing.

Introduction

In recent years, sustainability has become central to corporate strategies. The need to face global challenges such as climate change and the exploitation and consequent exhaustion of natural resources, combined with the growing pressure from consumers and investors to adopt more sustainable approaches, has led companies to change their modus operandi.

In this context, Mergers and Acquisitions, also called "extraordinary transactions," have become crucial not only as tools for consolidation and growth but also as drivers of accelerating the transition toward more sustainable business models.

Green Mergers and Acquisitions (GMA) are operations in which at least one of the involved actors is oriented towards adopting sustainable practices or holds resources, specific skills, and technologies aimed at improving environmental sustainability.

These green operations represent an innovative opportunity to integrate green skills and technologies and to respond to pollution reduction, greater energy efficiency, and compliance with ESG (Environmental, Social, Governance) principles.

These transitions allow companies to reduce their ecological footprint while responding to growing regulatory pressures and consumer and investor demands for more sustainable products and services.

GMAs are, therefore, a strategic tool capable of addressing fundamental strategic challenges. On the one hand, they allow companies to align themselves with environmental regulations, such as the 2015 Paris Agreement, or European policies, such as the European Green Deal. On the other hand, they give companies the opportunity to position themselves as market leaders, attracting more investors and strengthening brand reputation.

This thesis aims to analyze the phenomenon of Green Mergers and Acquisitions. In the first chapter, we analyze traditional Mergers and Acquisitions, highlighting their typologies and strategic motivations. We then connect these extraordinary

operations to the theme of sustainability and, therefore, of the GMAs. We report an analysis of these strategies in the Chinese market, considering a particularly highly polluting sector, by analyzing the case study of the Chinese giant Gezhouba Group.

CHAPTER 1: Mergers and Acquisitions (M&A)

1.1 What are Mergers and acquisitions?

Mergers and acquisitions are strategic growth tools for companies, which profoundly influence the structure and competitiveness of the market. According to Bain & Company, the value of global M&A deal reached 3.8$ trillion in 2022.

These extraordinary operations can materialize through a merger between two or more companies or through the complete acquisition of an entity by another. Although in most cases merger and acquisition seem a unique thing, however they have different meaning and effects.

In the case of the merger, a new company is created where the companies that have decided to merge, they hold control of the same. The situation is different in the case of the acquisition, where the buyer acquires more than 50% of the quotas of the "target" which is the other company or part of it, taking control over the latter in all respects.

The first mergers and acquisitions by companies date back to the 19th century during the industrial revolution and continue today, being considered a fundamental lever for business expansion, access to new technologies and markets and allowing the creation of economies of scale.

In the current economic system, characterized by greater competition and the need for continuous innovation in order to generate an economic advantage, the M&A represent a fundamental strategy for companies that aspire to rapid growth externally. This approach allows companies to expand their market share, to access new skills, technologies and resources and also give the opportunity to diversify their business.

Companies by implementing this strategic procedure can improve their position in the market, optimize costs and be in great respond to the challenges of the market.

To sum up, mergers and acquisitions are strategic tools that allow companies to

grow rapidly, strengthen their market position, and optimize costs. In a highly competitive and innovative environment, these operations provide a valuable opportunity for expansion, diversification, and maintaining a competitive edge.

1.2 History of M&A

The history of mergers and acquisitions (M&A) has its roots in the first industrial revolution, when the growth of industries and the expansion of markets created the conditions for the first consolidation operations.
However, if its roots date back to the 19th century, it is in the 20th century that we observe a concentration of periods of intense activity, forming "waves" followed by calmer phases.
The waves are defined by scholars as "Merger Waves" and have repeated themselves six times, each characterized by different economic and industrial situations.
Their durations and their beginning have not been fixed, but the end of each has always coincided with a major economic crisis and/or war events.
Regarding the individual waves, the first two mainly concerned the US market, while the subsequent ones extended first to Europe and finally to the Asian continent, which acquired a significant role starting from the fifth and sixth wave.
This sequence of “waves”, which will be explained in more detail below, reflects both technological and industrial changes and the influence of events occurring at the macroeconomic and geopolitical levels, highlighting the way in which mergers and acquisitions have become a global phenomenon.

It’s possible, therefore, to summarize the 6 “Waves” in the following way:

- First wave (1893-1904): this wave emerged in a context of economic growth and one of its main characteristics was the consolidation of large manufacturing companies, such as those linked to the oil, chemicals, mining and steel industries. This consolidation occurred thanks to a horizontal expansion of companies, which facilitated the formation of monopolies. In 1890 the Sherman Act was introduced in America, an antitrust law that aimed to combat monopolies and cartels. However, the Sherman Act

initially had limited effect as its provisions were not effectively enforced allowing companies to continue pursuing monopolistic practices.

Although the reasons that gave rise to the first wave are still not entirely clear, the same cannot be said about its end.

In fact, the increasingly stringent application of regulations, including the Sherman Act itself, the stock market crash in 1904 which led to a phase of economic stagnation, and the specter of the First World War, put an end to this first wave of mergers.

- Second wave (1920-1929): The second wave, like the first, mainly affected the US market, although with a smaller impact than the previous one.

  It concentrated mainly on the food sector, printing, paper and iron.

  This phase followed the First World War, during a period of economic recovery and greater attention to the control of monopoly power.

  The main difference with the first wave was linked to the structure of the market, while in the first there were situations of monopoly, the second marked the birth of oligopolies.

  An oligopoly is a market structure characterized by the presence of a limited number of dominant firms in an industry. In this type of market, a few companies have control of the majority of the sales or production of a particular good or service.

  Returning to what happened in the second wave, small companies that did not take part in the first began to actively participate in the merger market with the aim of obtaining economies of scale to be better prepared to compete against the consolidated monopolies of the wave that ended in 1904.

  It is also possible to state that the phenomenon of oligopolies also arose as a result of the limitation of resources that large companies had to suffer, still marked by the previous crisis and increasingly subjected to more rigorous

antitrust regulation, such as for example the already mentioned Sherman Act but also the Clayton Act issued in 1914 against monopolistic behavior. This wave ended with the market crash of 1929, which triggered the Great Depression and led to a global economic crisis in the years that followed.

- Third Wave (1955-1975): this wave began in the 1950s following a long period of slowdown in the M&A market due to the Great Depression, which marked the end of the second wave, and the Second World War. Even in this phase there were increasingly restrictive antitrust measures, aimed at preventing potentially anti-competitive mergers and acquisitions.
  Following this, many companies began to focus on diversification strategies, differentiating themselves from the previous waves characterized in most cases by horizontal mergers (first wave) and vertical mergers (second wave).
  As a consequence of diversification, the first conglomerates (large companies that expanded their operations into multiple, often unrelated industries) were born.
  Thanks to conglomerates, companies can reduce the volatility of cash flows, distributing the risk in different sectors. Another advantage of conglomerates is that it is possible to protect oneself from specific crises in a sector and seize growth opportunities in sectors not connected to each other, also making oneself less dependent on external capital thanks to the creation of internal capital markets.
  This wave began to suffer its first setbacks due to the oil shock in the first half of the 1970s and then ended definitively following a strong recession caused, precisely, by the energy crisis.

- Fourth wave (1984-1989): In this wave of mergers, completely different from the previous ones, the main distinguishing element was the high number of operations characterized by hostile offers, that is, carried out and

conducted without the approval of the target companies. These operations, although typical of acquisitions, are however linked to mergers, since negotiations between the parties often transformed the acquisition attempts, initially unilateral, into real consensual mergers.
Another distinctive element of these years and this wave was the size of the companies that were involved. Unlike the others, which aimed at smaller and more easily achievable goals, in this case the operations were instead concentrated on a large scale. As a result, to finance these operations, a change in financial strategies was necessary.
While previously merger operations were mainly financed with equity, in this case they were financed through the use of debt. This change reflected both the availability of more advanced financial instruments and a greater tolerance for risk on the part of companies.
This wave was also linked to the aftermath of the third wave of conglomerate mergers, as many large, diversified firms began to divest divisions that were no longer considered strategic or inefficient. This divestment phenomenon, which constituted a significant portion of M&A activity during the period, generated a cycle of expansion and downsizing. Growing firms took advantage of these divestments to acquire resources and strengthen their competitive position.
As for the end of this wave, there was a slowdown in the late 1980s, culminating in the stock market crash and economic recession that marked the end of the cycle.

- Fifth wave (1993-2000): The 1990s represented a decade of great economic prosperity, characterized by a boom in financial markets and the phenomenon of globalization. This dynamic was also reflected in mergers and acquisitions activities, which reached a significant level not only in America and Europe, but also found growing space in Asia.

Thanks to globalization, many companies sought new growth opportunities beyond their national borders, significantly increasing cross-border acquisitions.

During this fifth wave, companies around the world positioned themselves in emerging markets in order to compete increasingly globally.

For example, in Asia, with its rapid economic development, considerable opportunities were created for Western multinationals.

Furthermore, this wave was characterized by the implementation of operations of extraordinary dimensions, often defined as "mega-deals". Some emblematic examples of extraordinary operations were the mergers between Citibank and Travelers and Exxon and Mobil.

Even in Asia, for the first time, extraordinary operations were recorded, for example the merger between Mitsubishi Bank and Bank of Tokyo gave rise to one of the largest banking institutions in the world.

However, as happened in previous waves, this phase was also interrupted by an economic crisis.

With the beginning of the new millennium and the collapse of the stock markets, the fifth wave also began to wane.

- Sixth Wave (2003-2007): this wave, like the previous one, was influenced by globalization and developed mainly in the United States, Europe and Asia (especially China and India).

  Obviously, due to the size of the market, the US one was dominant with M&A operations aimed at the technology, telecommunications, energy, finance and energy sectors. The growth was fueled by high liquidity, an element that characterizes this wave, and favorable interest rates.

  At the same time in Europe, these practices developed more thanks to the integration of European countries and the introduction of a single currency, the euro. Also in the European continent the sectors most affected by M&A operations were energy, telecommunications and financial services.

Some countries in the Asian continent, China in particular but also India, continued their M&A process started in the fifth wave.

The two countries, with strong rapidly growing economies, were not only recipients of foreign investments but also active buyers on the international market. This is also thanks to globalization that allowed some countries of the Asian continent to have an important role in this wave. However, this wave, like many of the other 5, ended following the financial crisis of 2007/8, which began in America but then affected all global economies.

To summarize what has been said, it is possible to affirm that the history of mergers and acquisitions shows how economic, technological and geopolitical evolution have influenced the dynamics, over the years, of global markets.
The six waves highlight the transition from an initial industrial consolidation, mainly on a national scale, in particular the first two mainly concerned the United States, to an ever greater economic and global integration, culminating with the rise of Asian markets in the sixth wave.
Each wave had a unique mix of opportunities and challenges, with strategic and financial innovations that changed the ways in which companies pursued growth and competitiveness.
However, each wave ended with a major economic crisis, underlining the cyclical and interdependent nature of the phenomenon of these extraordinary operations.

1.3 Motivations for M&A

Growth through external means is one of the strategies most used by companies worldwide today to expand rapidly and achieve their goals. The speed of implementation represents a fundamental variable to keep up and is often the reason that leads to choosing mergers and acquisitions, which allow entering new markets or obtaining access to existing distribution channels more quickly than internal growth, bringing companies into a position of competitive advantage. Companies implement these extraordinary growth operations to rapidly increase their market share or acquire new skills, saving the long and typical times of "autonomous" development.

In fact, in today's globalized and fiercely competitive world, companies need to be able to offer new goods and services, grow their clientele and expertise, and possibly even become industry leaders in order to survive.

A company can decide to undertake external growth but always remaining within its core business or it can decide to diversify by entering new sectors also allowing it to reduce, from a financial point of view, its risk. The Johnson and Johnsons' case represents an example of growth through acquisitions within its business. In fact, from 1994 to 2017 the company has acquired more than 70 competitor companies, in order to obtain a competitive advantage and increase its profitability (Fig.1.1).

Fig. 1.1 Some of the most important acquisition made by Johnson and Johnson from 1994 to 2017

Company Acquired	Primary Focus	Date	Size in $ Billions
Actelion	Rare diseases	2017	30.0
Synthes	Trauma devices	2011	21.3
Pfizer Consumer Healthcare	Consumer healthcare	2006	16.6
Alza	Drug delivery	2001	12.3
Centocor	Immune-related diseases	1999	6.3
Abbott Medical Optics	Eye health	2016	4.3
Depuy	Orthopedic devices	1998	3.6
Vogue Intl.	Personal care products	2016	3.3
Scios	Cardiovascular diseases	2003	2.4
Crucell	Biotech	2011	2.3
Cordis	Vascular diseases	1996	1.8
Alios BioPharma	Viral therapies	2014	1.8
Inverness Med. Tech.	Diabetes self-management	2001	1.4
Mentor Corporation	Medical products	2008	1.1
Aragon Pharmaceuticals	Prostate cancer treatment	2013	1.0
Cougar Biotechnology	Cancer drug development	2009	1.0
Neutrogena	Skin and hair care	1994	0.9
Acclarent	Medical products	2009	0.8
Micrus	Stroke devices	2010	0.5

Source: Gaughan, 2018

Another example of external growth is geographic expansion, which allows companies to enter new markets by expanding their global presence. For example, by acquiring companies that are already established in a given territory, companies can quickly gain access to distribution networks, existing customers and market knowledge, significantly reducing the time and costs associated with entering a new market.
One of the objectives of companies, in addition to obtaining a competitive advantage, is the creation of value. Through M&A it is possible to obtain synergies

that allow, through the combination of several companies, to create greater value than if they were separate.
To explain briefly, more clearly, what is meant by synergy and its effects, I think this part of the text taken from the book "Mergers, Acquisition and Other Restructuring Activities" by DePamphilis is useful, "Synergy is the value realized from the incremental cash flow generated by combining two or more businesses. That is, if the market value of two firms is 100$ million and 75$ million, respectively, and their combined market value is 200$ million, then the implied value of synergy is 24$ million."
What the author reports highlights a key concept in mergers and acquisitions: synergy as a source of added value, as value creation.
By combining two companies it is possible to generate incremental cash flows that are higher than those obtainable separately, leading to value creation.
With regard to synergy, it is possible to divide synergies into operating synergies and financial synergies:

- Operating synergies: it refers to the benefits and efficiency improvements that arise when two or more companies decide to merge. They mainly concern economies of scale, scope and operation. These kinds of synergies generally occur when companies that decide to join together operate in the same sector, thus allowing, for example, the exploitation of shared resources, avoiding duplication of processes and therefore generating economies of scale.
- Financial synergies: it refers to higher cash flows and a reduction in the cost of capital. The merger also allows for increased financial stability, giving companies the opportunity to access, for example, loans with better conditions.

Another reason that leads companies to decide to carry out these operations is linked to the diversification strategy.
Diversification strategy is a growth strategy through external means and occurs when a company decides to implement business growth by entering new markets and sectors and expanding into unoccupied markets.
This type of strategy allows, through mergers and acquisitions, to balance revenues for example, since any losses or difficulties in one sector can be compensated by successes in another.
Acquiring a company in a different sector therefore allows to reduce dependence on a single market and to protect oneself from economic fluctuations.
An example of successful mergers and acquisitions through diversification strategy is General Electric (GE), which was an American multinational corporation dedicated to technology and services. Thanks to mergers and acquisitions in different sectors, including finance, energy, medical and aerospace, the multinational was ranked among the 14 most profitable companies in the world in 2011.
In conclusion, companies pursue mergers and acquisitions to accelerate growth, achieve competitive advantages, and enhance value through synergies. By combining resources, expertise, and markets, businesses can expand their reach, increase efficiency, and reduce risks associated with operating independently. This approach often enables them to gain market share, diversify revenue streams, and strengthen their financial positions, positioning them more favorably in a competitive, globalized economy.

1.4 Typologies of Mergers

Corporate mergers, as described so far, represent outward growth strategies implemented by companies in order to expand their market share and business, enter new industries through diversification, and improve their strategic and financial situation through synergies.
There are three different types of mergers, and these are divided into:

- Horizontal Mergers: we talk about this type of merger when two companies operating in the same industry, often within the same market, decide to get together in order to strengthen their competitive position in the market, reduce competition and obtain economies of scale resulting from the combined production process (Kaplow, 2021).
- Vertical Mergers: it refers to companies that operate at different stages of the production or distribution chain for a product or service, allowing them to have control over the entire supply chain. Through this category of mergers, companies have the opportunity to gain important strategic advantages, such as, for example, cost reductions due to the elimination of intermediaries.
- Conglomerate mergers: it involves companies operating in different sectors. It is mergers that allow companies to diversify their risk, giving them the opportunity to expand into new sectors and markets.

These three types of mergers offer insight into the different startegies that companies can implement should they decide to implement a merger process according to their needs and requirements being that they differ in both ways and effects.
They will be analyzed in detail in the following paragraphs

1.4.1 Horizontal Mergers

Horizontal Mergers are a fundamental strategy for companies that operate in the same business and aim to consolidate their competitive position in the market. There are several reasons that push companies to implement this type of merger, including the possibility of increasing market share and reducing competition in their sector, enjoying greater economies of scale, achieving economies of scope and obtaining a competitive advantage.
Following a horizontal merger, two different situations could occur: the first, which would allow companies, operating in the same market, once merged, to unilaterally exercise market power, in turn increasing prices and having full control over the latter, and the second in which the merger could favor collusion. This last situation generally occurs when companies have decided to merge and are not able to unilaterally exercise market power, causing other conditions to be created such as collusion. (Motta, 2003).

Before going into detail, it is necessary to explain what is meant by market power and collusion.
Market power is the ability of a company to influence market prices or other conditions, such as the availability of goods, in order to increase its profits. When a company has high market power, it can set higher prices than a competitive market, since it does not fear losing a significant share of customers due to few alternatives. This market power can occur for many reasons, such as the presence of few alternatives on the market, high costs for changing suppliers, or a dominant position in terms of distribution.
To measure the market power of a company, the Lerner Index is used.

The index is given by the difference between the price and the marginal cost, all related to the price.

In terms of results, a value close to 1 indicates high market power, a monopolistic market, while a value equal to 0 indicates a market in perfect competition. Collusion, on the other hand, refers to an agreement, often made secretly, between two or more competing firms in order to coordinate their behavior on the market. The agreement has the purpose of reducing competition and keeping prices high, maximizing the profits of all the firms that are in that market.

There are two types of collusion:

- Explicit collusion: where companies openly agree to set prices and divide market share. However, this type of behavior is illegal and is often prosecuted by antitrust authorities.
- Tacit collusion: in this case the companies do not agree among themselves directly,but decide to adopt a collusive behavior by observing the competitors and adapting at the same time.

Returning to the situations that can occur following a horizontal merger, in the first case, if the companies that decided to merge had the ability to unilaterally exercise market power, this would lead to a decrease in consumer surplus and total welfare. Obviously this condition is linked to the number of companies that are on the market, if there were few competitors, the companies that have decided to merge would have greater market power and therefore could act as if they were monopolists, while if there is a market characterized by many competitors, the market power of the companies that have given rise to the merger will be lower and their ability to implement higher prices will be lower. Concentration therefore appears to be a very important market variable on the effects of this type of merger.
As with market power, concentration also has its own index to measure the degree of concentration of a market and this is the Herfindahl-Hirschman Index (HHI). However, there may be cases in which the competitors in the market benefit from a merger. This occurs when there are no efficiency gains. Efficiency gains allow the company resulting from the merger to make

improvements in terms of productivity, a reduction in costs and an optimization of resources, thus allowing it to operate at better prices, with higher margins and to be, therefore, more competitive.
In the absence of efficiency gains, the company, once the merger has taken place, is unable to improve its structure, while competitors who have not had to face a merger can maintain a competitive advantage on prices, for example.
The second item that may occur following a horizontal merger is given by the pro-collusive effects.
It may happen that under normal conditions, also depending on the characteristics of the market, companies without a merger operation taking place are not able to implement collusive agreements between them, while, in some cases, the merger could favor this (Motta, 2003).
Generally, this phenomenon occurs in a market characterized by few competitors, also because it would be more practical for a few companies to reach an agreement, rather than in a market with many competitors.
However, a market characterized by few competitors is not the only factor that causes collusion to occur in the market, but as reported in the book "Competition Policy: Theory and Practice" by Motta, there are a series of factors that can favor collusion: "The more an industry is already characterised by the co-existence of factors which favour a collusive outcome the more risky to allow a merger, as it would further increase the likelihood of collusion. Such factors include the importance of entry barriers, the presence of structural links such as cross-ownership, the existence of information exchanges among firms, the presence of multi-market contacts, the regularity and frequency of market interactions, the absence of countervailing power and the existence of clauses such as best-price clauses and retail price maintenance" (Motta, 2003).
To sum up, collusion is therefore influenced by several factors, in addition to the simple number of competitors operating within a market. Although markets with few operators favor collusive behaviors due to the greater ease of coordination,

there are also other structural and strategic elements that play a significant role, especially when they coexist with each other.

1.4.2 Vertical Mergers

Vertical mergers, as previously mentioned, are strategic operations implemented by two or more companies that operate in different phases, within the same production chain, that decide to join together to create a single integrated entity. Unlike horizontal mergers, which involve competing companies, vertical mergers develop along the value chain, between a manufacturer and a supplier, in order to obtain greater benefits and increase their efficiency.
The objective of this type of merger is to increase operational efficiency, reducing transition costs and optimizing control over the value chain.
There are several reasons that justify a vertical merger, and these are addressed in the following lines.
This strategy allows companies to reduce their dependence on external suppliers or distributors.
Another key advantage which pushes companies to implement vertical mergers is the possibility of gaining a competitive or differentiation advantage, as the merger allows the company exclusive access to crucial resources or distribution channels. This vertical integration allows the company to reduce its dependence on external partners, making it more flexible and rapid in responding to market changes. Furthermore, this type of merger allows the creation of synergies, allowing the organization to reduce costs.
The most pursued synergies are the following:

- Financial Synergy: refer to the possibility of the company resulting from the merger to reduce its financial difficulties. Thanks to the merger, the company can use the available funds to expand, increase its ability to obtain new financing and increase its debt capacity. The merger therefore makes

it possible to improve the financial solidity and growth capacity of the company, also making it more attractive for potential financiers or investors.

- Managerial Synergy: through this synergy it is possible to improve the management efficiency of a company. They therefore refer to the advantage obtained by improving the quality of the management team. Vertical mergers allow you to restructure management roles, replacing members of management who are not efficient enough or who are not achieving expected results with more competent and efficient executives from the merging companies.
- Operating Synergy: refer to an improvement in the management and optimization of the supply chain that occurs following a vertical merger, as it allows combining the strengths of the companies involved, integrating their processes, their skills and their resources. Through these synergies it is therefore possible to have a more fluid and better coordinated supply chain, increasing the overall operational quality.

Before analyzing the effects and consequences of vertical mergers on the market, it is appropriate to give an example of a vertical merger.

The example of a vertical merger examined concerns the eyewear sector and illustrates how Luxottica, an Italian eyewear manufacturer, has become dominant in the American market by expanding its control over the entire production and distribution chain.
The strategy implemented by the Italian company was to acquire companies that operate in different phases of the supply chain, transforming it into an integrated and independent force in both the production and distribution phases.

First of all, Luxottica acquired LensCrafters and Sunglass Hut, retail distribution chains. The first specializes in the sale of eyeglasses, while the second specializes in the sale of sunglasses. Thanks to this, Luxottica has assumed direct control of a

large network of stores in which it can distribute its products, ensuring exclusive and preferential visibility for its products.

In addition to downstream integration, as demonstrated by the cases of LensCrafter and Sunglass Hut, Luxottica has also integrated upstream, thanks to the purchase of Essilor, a French company that is a world leader in the production of lenses, thus completing the entire supply chain in the eyewear sector. Regarding the effects that may occur following a vertical merger, the market, competition, and consumer welfare are all impacted by vertical mergers in complicated and frequently conflicting ways. The empirical literature on this topic has produced contradictory findings, demonstrating how these mergers can have both pro- and anticompetitive consequences. This emphasizes how crucial it is to assess vertical mergers case-by-case rather than depending on broad generalizations about whether they are beneficial or detrimental.

A further benefit of vertical mergers is the possibility of increased operational efficiency, often known as the removal of double marginalization (EDM). Different agents in a distinct supply chain experience a decrease in profit margins as a result of eliminating double marginalization. These hard pricing margins are lowered when combined, which lowers overall expenses and customer prices. This typically indicates that the final outcome will be a rise in the overall welfare from the relevant market. For instance, reducing double marginalization through vertical mergers may improve the effectiveness of the way commodities and services are distributed. This happens as a result of improved coordination between various production fractions and decreased transaction costs. These advancements may result in more innovation and cheaper costs for customers, raising the caliber of goods available on the market.
Conversely, vertical mergers may also have a major anticompetitive impact. One of the tangible consequences is "foreclosure," where the rival is essentially shut out of essential resources or distribution networks, leading to a decrease in competition and an increase in pricing. This happens when a newly established

business obtains control of a sizable portion of the vertical chain and utilizes it to bar competitors from accessing the market, making it harder for rivals to compete with them.

1.4.3 Conglomerate Mergers

Conglomerate mergers occur when two or more companies operating in different sectors and markets merge.
These kinds of mergers are different from other forms, such as horizontal mergers, where the companies that decided to merge are competitors in the same market, or vertical mergers, where the company are distributed in the same supply chain. Generally, companies pursue this merger strategy to diversify and expand their business.
Regarding the effects caused by these mergers, it is possible to identify several, both positive and negative.
As for the positive ones, conglomerate mergers allow to increase the diversification of a company's activities and products, reducing the overall risk thanks to the fact that the company operates in multiple sectors. This makes the company resulting from the merger more ready to face moments of crisis, maintaining a stable and profitable position in the various markets in which it operates.

Although there are positive effects on the company resulting from the conglomerate merger, the same cannot be said for the market.

In fact, such mergers allow the merged company to increase its market power. Through tying and bundling, the company can use its large, resulting product range to increase sales and limit competition in the market.

With tying, the company essentially requires consumers to buy one product as a condition of buying another. This practice can lead to a reduction in competition,

as it forces consumers to buy products from a single company rather than having the freedom to choose between several manufacturers.

With bundling, on the other hand, the merged company sells its products together in a package, often at a lower price than the products purchased separately. While this may be advantageous for consumers in some ways, it is not so for the market since it could put out of business competitors who are not able to offer similar packages, consequently leading to a stronger market position for the entity resulting from the merger, also limiting competition on the market. Furthermore, this type of merger can create barriers to entry for new competitors. In fact, the combined company, present in multiple markets, can exploit economies of scale that make it difficult for new companies to enter and compete, for example on prices or on the variety of the offer.
Finally, another negative effect is the risk of foreclosure, that is, that the company uses its market position to prevent competitors from accessing essential resources or distribution channels. Following a conglomerate merger, the company could, therefore, consolidate its market power leading to a monopoly or quasi-monopoly situation.
To sum up, this category of mergers offer enormous advantages in terms of diversification and potential growth to the new entity resulting from the merger, but they can also create disadvantages, especially in the market where competition is limited, prices can increase and consumers' freedom of choice can decrease.

CHAPTER 2: GREEN MERGERS AND ACQUISITIONS

2.1 Introduction

In recent years, our planet has been facing one of the most critical challenges in its history: climate change and global warming.

The growing awareness of the devastating effects of human activities on the environment has brought climate change and global warming to the center of global priorities.

The mechanism underlying these phenomena is the greenhouse effect, a natural phenomenon that retains part of the solar heat in the Earth's atmosphere, keeping the planet warm enough to support life on the planet.

The increase in the greenhouse effect has been, and still is, fueled over the years by activities such as the burning of fossil fuels, deforestation and intensive farming, which have caused greenhouse gas emissions into the atmosphere to increase.

The main responsible for this is certainly carbon dioxide (CO2), with levels in 2020 higher than 48% compared to the pre-industrial era.

The past decade, 2011-2020, was the warmest on record, with average global temperatures reaching 1.1 degrees above pre-industrial levels. This increase, estimated today at a rate of 0.2 degrees, underlines how it takes very little now to exceed the critical threshold of 2 degrees, which would have catastrophic consequences for humans and ecosystems.

In an attempt to counteract this emergency at a global level, several international initiatives have been launched to reduce greenhouse gas emissions and promote sustainable issues.

One of the most important measures at a global level, if not the most important, is the 2015 Paris Agreement, which represents a milestone in global climate efforts,

setting the goal of limiting the increase to below 2 degrees compared to pre-industrial levels, with an effort to limit it to 1.5 degrees.

The European Union has also taken action, introducing the European Green Deal in 2019, which outlines a strategy to ensure that the European Union is climate neutral, meaning carbon free, by 2050.

These problems not only affect humans and ecosystems, but also companies. In this context, numerous companies have begun to integrate aspects of environmental sustainability into their strategies, through corporate social responsibility (CSR).

CSR represents the set of practices and initiatives implemented by companies in order to contribute to the well-being of society and the environment.

To face this challenge, more and more companies are adopting a strategic approach, investing in sustainable technologies and acquiring companies with a strong environmental footprint.

This process, which will be described better in the following paragraphs, is called Green Mergers and Acquisitions (GMAs) and can allow companies to reduce their environmental impact, increase their productivity, have competitive advantages and also be more "attractive" on the market, thus contributing to a more sustainable future.

In this context, the number of Green Mergers and Acquisitions operations has been steadily increasing in recent years. For instance, only in 2018, the total value of GMAs in the world has reached 8.905 billion dollars, highlighting the growing importance of these practices in the global business landscape.

2.2 Green Mergers and Acquisitions (GMAs)

Given the environmental challenges at a global level, Green Mergers and Acquisitions represent innovative strategies adopted by companies to face these issues.

It is appropriate, before going into detail on the topic, to report a definition of GMAs: "GMAs are strategic operations in which companies integrate environmental sustainability objectives into their activities, acquiring or merging with other companies that develop green technologies or practice sustainable solutions" (Salvi et al., 2018).

Thanks to these practices, companies can quickly access renewable energy technologies, green resources or sustainable practices, allowing them to reduce their ecological footprint and align with environmental regulations and market expectations.

Following the growing concern and pressure of governments, along with that of consumers regarding climate issues, GMAs represent an almost constrained choice to pursue, but likewise they can become a source of competitive advantage in a market where sustainability plays an increasingly crucial role.

They also represent the fastest way for companies, as also seen in the first chapter, with regard to the speed of growth by going externally, to accelerate their own path to sustainability by reducing their carbon footprint.

Regarding the types of GMAs it is possible to distinguish them in "Exploratory GMAs", which are focused on the merger or acquisition of new skills and technologies to develop innovative solutions, and "Exploitative GMAs", which concern existing practices and technologies in the companies with which this operation is applied to optimize processes and reduce environmental impact (Wu et al., 2021).

These types differ, therefore, in their approach to innovation, development and sustainability.

As briefly described above, the first are strategies aimed at something that is not yet fully developed or known from the point of view of technologies and skills, allowing companies that apply this typology to develop innovative sustainable solutions.

An example of this type of GMA can be given by a highly polluting company that operates with fossil fuels and acquires a startup in the renewable energy sector. Consequently, this acquisition allows it to accelerate its transition to a technologically better and more ecological business model.

Although this type of operation could be less expensive than the exploitative one due to the fact of purchasing, for example, a startup, rather than a consolidated company, it is however riskier as the technologies acquired may be new and not yet fully tested.

Exploitative ones, on the other hand, are based on the use of resources, technologies and skills already developed for some time by the company that one decides to acquire or with which one decides to merge.

The buyer therefore integrates these resources, already consolidated, into its own business model to improve its efficiency (Jingjing, 2022).

A concrete example of the exploitative is when an oil company decides to acquire or merge with a company specialized in carbon capture and storage.

In this way, this already consolidated technology, is used by the acquiring company which integrates it into its activities to reduce carbon emissions, improving sustainability and complying with environmental regulations.

This typology is certainly less risky than the previous one but does not aim to develop new innovations, as it exploits solutions that already exist in order to make its processes less impactful.

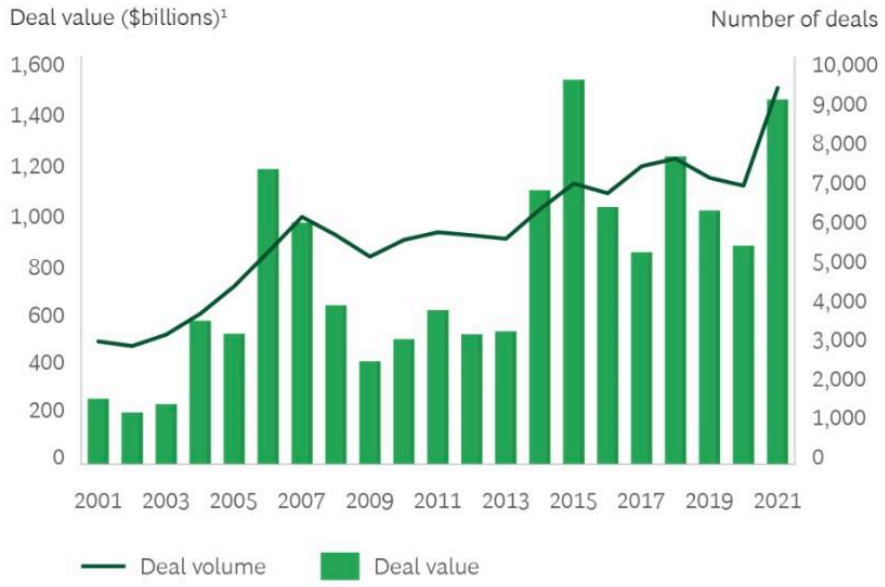
Regardless of the type of GMA applied, it is possible to state that GMAs will be increasingly important over the next few years, as they not only bring sustainable benefits but also strategic ones, in terms of efficiency, knowledge and technologies (Shi et al, 2017).

Furthermore, using green practices enhances a company's brand and fosters

consumer trust. Businesses that engage in GMAs can establish themselves as industry leaders in sustainability, drawing partners and new investors. Finally, a recent analysis conducted in 2022 by Boston Consulting Group (BCG) shows the ever-increasing importance of green mergers and acquisitions as a strategic lever for the environmental transformation of companies.

In fact, the annual volume of operations linked to ESG (Environmental, Social and Governance) criteria at a global level has increased from approximately 5.700 in 2011 to a record 9.200 in 2021 (Fig.2.1), recording a growth of 60% in the last decade.

Fig. 2.1 The volume and the value of ESG deals from 2001 to 2021.

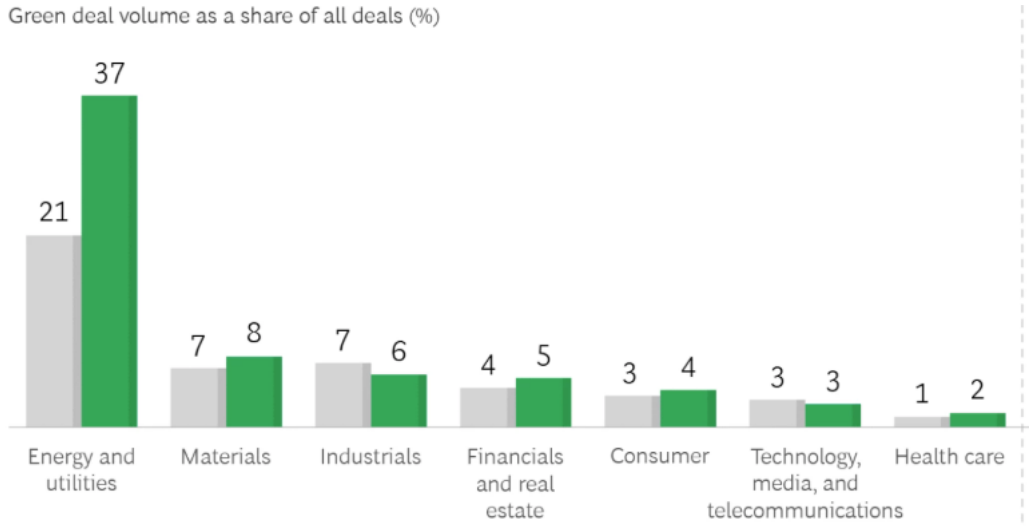


Source: Refinitiv Workspace

This growth in GMAs operations has also been sectoral and has mostly concerned emerging markets, such as the Chinese one which will be analyzed in the next chapter.

The sector that has had the fastest growth of GMAs, in the decade from 2011 to 2021, has been the energy and utilities sector, while other sectors have gone more slowly (Fig.2.2) not making the same progress made by the energy sector.
On the contrary, sectors such as telecommunications and healthcare have not implemented these extraordinary operations much. Despite there being a growing awareness of the importance of reducing their environmental footprint, companies in these sectors prefer to invest organically rather than implementing M&A operations.

Fig. 2.2 Green deal volume as a share of all deals in 2011 (grey) and 2021 (green)



Source: Refinitiv Workspace

In emerging markets, however, the Middle East and Asia are leading this trend towards GMAs.

The Middle East is the region with the highest number of these activities. According to the Boston Consulting Group report, in 2021 over 10% of M&A operations concerned environmental sustainability.

The Asian continent is slightly behind the Middle East in terms of these operations, with a share equal to 8% of total operations in 2021.

China is among the countries with the greatest activity in terms of green mergers and acquisitions also in response to the fact that the country is one of the most polluted in the world.

2.3 Motivations for GMAs

Green Mergers and Acquisitions (GMA) are increasingly becoming a key strategy to integrate sustainable practices into business operations.

Through these operations, companies can have the ability to address growing environmental challenges, such as climate change, resource depletion and pollution, while responding to market demands and increasingly more regulations issued at national and international level, such as the European Green Deal and the Paris Agreement.

The choice to carry out these operations is mainly driven by three interconnected factors: greater environmental awareness, the search for competitive advantages which can be obtained thanks to these practices, and technological innovation.

These elements, together, allow GMAs to achieve sustainability by adopting greener practices and at the same time allowing companies to improve operational efficiency.

They are briefly summarized below, before being analyzed in more detail in the following paragraphs:

- Environmental awareness: The increasing sensitivity and attention to climate change, the depletion of natural resources and high levels of pollution is putting increasing pressure on companies to reduce their environmental footprint.

  Regulations, strengthened by Paris Agreement and European Green Deal, are leading companies to innovate and adopt more sustainable practices.

  In this context, GMAs are fundamental and strategic practices for companies.
- Competitive advantages brought by GMAs: In the modern economic context, corporate reputation is strictly connected to the links they have with sustainability. Companies that manage to distinguish themselves from others in terms of sustainable practices, not only strengthen their competitive positioning but also attract new investors linked to ESG

aspects. The latter can benefit from favorable conditions from financial institutions or governments themselves that incentivize investments in sustainable activities.

- Technology and Innovation: GMAs give companies the opportunity to integrate advanced technologies from target companies and improve their reputation and credibility, as mentioned above.

  This provides companies with a very important strategic advantage, improving the sustainable perception in the eyes of the market and consumers.

  Advanced technologies and the development of green technologies are a crucial element for the sustainable transformation of companies.

  The acquisition of green technologies or specialized skills allows companies to accelerate their path towards sustainability, without having to develop them internally.

  Through these operations it is possible to bring about an increase in operational efficiency and a significant reduction in the overall ecological impact.

  Furthermore, they give the opportunity to absorb the best practices and experience gained from target companies, providing companies with concrete tools to respond to the growing demands for sustainability from the market and regulations.

Finally, another motivation that drives companies to implement these procedures is represented by government subsidies, which aim to accelerate the transition to a more sustainable economy. These subsidies, which can be provided in different forms (through tax breaks, direct grants and financing at preferential rates), are designed to support investments in green technologies and business models with a lower environmental impact.

Among the most important, it is possible to mention programs such as the Investment Tax Credit (ITC) in the United States, which supported the installation of solar systems and other forms of renewable energy, or the European Green Deal

in Europe, which will be analyzed in the following paragraphs, which provided financing to companies that implemented initiatives related to energy efficiency and the reduction of emissions.
Often, however, beyond the benefits generated, there is the risk that companies implement opportunistic behaviors, such as greenwashing, in order to obtain subsidies without actually committing to green practices and without bringing about any type of concrete change.
In these cases, GMAs operations are used only to improve the company's reputation in the eyes of investors and consumers by obtaining immediate economic benefits instead of promoting a real transition towards a more sustainable economy, consequently fueling the phenomenon of greenwashing.

2.3.1 Environmental awareness

As already discussed in this chapter, one of the main motivations that push companies to adopt more sustainable practices is the growing environmental awareness.
The global situation regarding issues such as climate change, pollution, the exploitation of limited resources, is increasingly critical and requires significant intervention by all actors in society including, above all, the corporate ones.
In an uncertain context like this, companies must adapt their business models both to respond to market needs and to ensure their own survival, seizing future opportunities in a world that will be increasingly linked to the concept of sustainability.
A crucial element that fuels this need is given by the ever-increasing regulatory pressure imposed by governments and national institutions.
There are more and more stringent measures aimed at regulating the global behavior of citizens and especially companies, requiring them to adopt greener practices and technologies.

These regulations do not only concern simple recommendations, but often require significant investments in innovations and structural adjustments aimed at respecting the imposed standards.

An example of this trend is given by the European Green Deal, which will be explored in the following paragraphs, a strategy that aims to make the European economy sustainable and achieve carbon neutrality by 2050.

This regulation sets important objectives for the reduction of emissions, promoting the adoption of renewable energy and clean technologies.

As a result, companies operating within the European Union will have to adapt to the regulations in order to avoid incurring sanctions and transform these "problems" into opportunities also with the help of dedicated funds.

In this context, companies with lower environmental sensitivity and awareness that are unable to adapt to new environmental standards risk incurring serious consequences that could even compromise business stability and continuity.

In fact, failure to adapt to regulations not only entails significant economic sanctions but also undermines the competitiveness and reputation of the company in a market that is increasingly moving towards sustainability.

To avoid these consequences, many companies are starting to implement an alternative strategic approach, Green Mergers and Acquisitions, which allow companies to accelerate their transition to more sustainable business models.

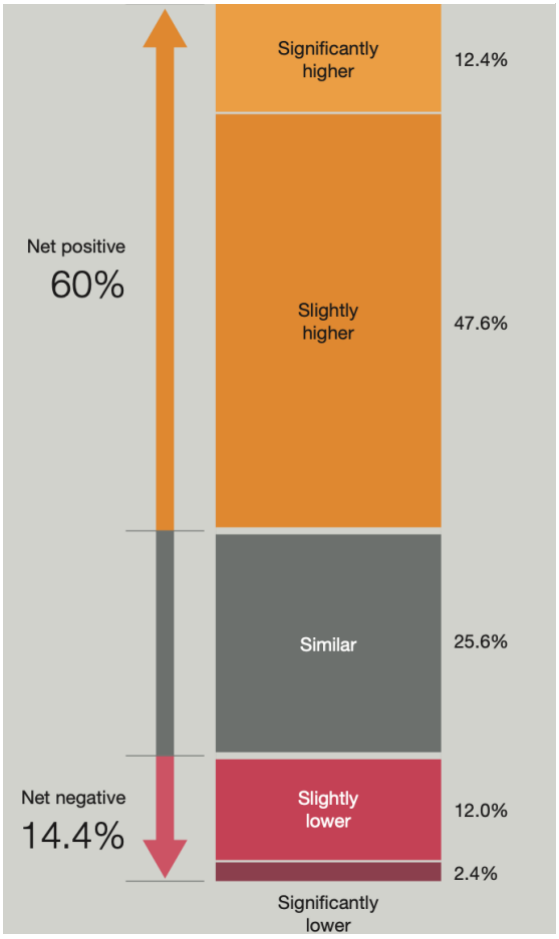
This approach allows companies to respond promptly to imposed regulatory pressures and the challenge of climate change, improving their reputation, positioning themselves as leaders in the adoption of sustainable practices and with significant advantages in terms of operational efficiency.

Another crucial factor that drives companies to adopt these practices is given by consumer preferences which, according to a study conducted by Weiss et al. (2021) are increasingly inclined to choose and support companies that seek to reduce their environmental impact and by investors' expectations.

In fact, just like consumers, investors prefer investments in companies that respect and pursue ESG criteria.

This is also demonstrated by the report drawn up by PriceWaterhouseCoopers (PwC) "Asset and Wealth Management Revolution 2022", which states that 60% of institutional investors have already seen that ESG investments have led to superior performance and higher yields (Fig. 2.2) compared to non-ESG equivalents.

Fig.2.2 Higher Yields reported by Investors on ESG Products in



Source: PriceWaterhouseCoopers (PwC) "Asset and Wealth Management Revolution

Always according to PwCs' report, 78% of investors would also be willing to pay higher commissions for this type of investment, highlighting the desire to support

companies that are truly and concretely committed to improving their environmental, social and governance performance.
Consequently, to attract new investors, companies are increasingly willing to implement these extraordinary operations, since a company's ESG rating increases following Green Mergers and Acquisitions, as it allows them to improve both their environmental performance and attract new investments.
So, in conclusion, growing environmental awareness, along with increasingly strong regulatory pressures, are driving companies to adopt sustainable practices, transforming business models globally.
In this context, GMAs are a strategic tool capable of accelerating this transition, allowing companies to comply with regulations, improving their ESG ratings and attracting sustainability-conscious consumers and investors.

2.3.2 Competitive advantages

GMAs represent one of the main strategies by which companies can integrate sustainable practices into their business models, strengthening their competitiveness in a constantly evolving market.
These operations allow companies to promote the transition towards more sustainable practices and responsibility and seize new economic and strategic opportunities, obtaining them competitive advantages on multiple fronts.
A first competitive advantage concerns corporate reputation.
Green Mergers and Acquisitions give companies the opportunity, as already mentioned, to improve their image in the eyes of consumers and investors, increasing their perceived value.
A practical example of the reputational advantage obtained thanks to GMA practices is given by the acquisition by Tesla (the US giant founded by Elon Musk, leader in the production of electric vehicles) of SolarCity, a company specialized in solar energy, in 2016.

Thanks to this operation, Tesla obtained a double effect, that of extending its offer to the field of renewable energy and that of increasingly consolidating its position as a leader in the green transition.

This acquisition allowed Elon Musk's company to integrate solar into its electric mobility solutions, creating a strong link between its vehicles and renewable energy.

This had a great impact on public perception, helping to further improve Tesla's reputation as a company committed to sustainability and the fight against climate change.

It also made the electric vehicle company even more attractive to investors as the acquisition helped it obtain the best ESG scores. This contributed to greater investor confidence and allowed access to capital on favorable terms.

A further advantage of GMAs is the possibility that these operations give companies the opportunity to quickly adapt to increasingly stringent environmental regulations.

Through these practices, companies have the opportunity to quickly obtain the tools and skills to comply with regulations, ensuring operational continuity and maintaining their competitiveness in the long term.

This is a fundamental aspect especially in emissions-intensive sectors, where the adoption of sustainable practices can turn a threat into an opportunity.

In fact, according to a study conducted by He et al. in 2023, in China GMAs are practices adopted by highly polluting companies to achieve green transformation.

Through acquisition or merger with environmentally friendly companies, highly polluting companies can integrate clean and less polluting production methods, improve efficiency and develop products and services with low environmental impact.

These companies to strengthen their competitiveness and accelerate their transition to more responsible operations (Salvi et. Al, 2018).

Therefore, GMAs help highly polluting companies, in China and elsewhere, to modernize their processes and align with international sustainability standards.

These operations do not just reduce environmental impact, but also promote the development of innovative solutions, such as the use of renewable energy, waste disposal and more responsible management of natural resources.

Thus, this approach allows companies to obtain double benefits, both environmental and economic, optimizing their production processes, reducing waste and at the same time reducing operating costs.

This generally occurs through the combination of the complementary resources of the companies involved, the adoption of innovative technologies and the acquisition of specific skills oriented towards sustainability.

Among the main benefits comes from the possibility of obtaining economies of scale and scope following the green merger or acquisition.

In fact, thanks to the integration of technologies and/or skills it is possible to rationalize the production structure by optimizing resources, reducing fixed costs and increasing productivity.

Another crucial aspect is linked to the ability of GMAs to incentivize innovations. Companies involved in these practices have the opportunity to access new resources and tools that favor the development of innovative products and processes, helping to differentiate themselves from their competitors and obtaining a competitive advantage.

A concrete example is given by Zhou et al. (2021) in which it is reported how GMAs contribute to companies operating in the industrial sector in China to obtain operational efficiencies thanks to these operations.

It is highlighted how companies operating in this sector, through extraordinary green operations, are able to integrate resources and technologies aimed at optimizing energy use, reducing carbon emissions and managing industrial waste in a more sustainable way.

2.3.3 Technologies and Innovations

Green M&As are a strategic and valuable instrument for businesses seeking to acquire cutting-edge technology and shorten the time it takes to move to more environmentally friendly business models. The need to quickly equip green technology resources, professional skills, and production efficiencies to ensure that businesses can compete at the right level is the driving force behind these transactions, which is driven by technological and inventive reasons. Along with improving operational performance and the ecosystem of the process, these activities also serve as a vehicle for economic development, pushing businesses toward innovation and market penetration also known as strategic development. The acquisition of new sustainable technologies is one of the main drivers behind companies' decision to engage in green mergers and acquisitions. Innovating internally to reduce emissions or improve energy efficiency can be particularly challenging, especially for high-impact sectors such as manufacturing, chemicals, and energy, as shown in Fig. 2.3.

Fig. 2.3 Industry distribution in China

Industry name	Industry code	The number of GMA	The number of non-GMA	Proportion of GMA
Ferrous metal mining industry	B08	0	3	0.00%
Non-ferrous metal mining industry	B09	0	13	0.00%
Ferrous metal smelting and rolling processing industry	C31	1	21	4.55%
Chemical fiber manufacturing	C28	1	15	6.25%
Textile industry	C17	2	18	10.00%
Petroleum processing, coking and nuclear fuel processing industry	C25	1	8	11.11%
Paper and paper products industry	C22	2	16	11.11%
Coal mining and washing industry	B06	3	17	15.00%
Non-metallic mineral products industry	C30	9	49	15.52%
Rubber and plastic products industry	C29	7	36	16.28%
Oil and gas extraction industry	B07	1	5	16.67%
Chemical raw materials and chemical products manufacturing	C26	25	123	16.89%
Non-ferrous metal smelting and rolling processing industry	C32	9	42	17.65%
Leather, fur, feathers and their products and footwear industry	C19	1	4	20.00%
Electricity, heat production and supply industry	D44	26	33	44.07%
Total	–	88	403	17.92%

Source: Science Direct

Innovation in sustainability necessitates substantial R&D expenditures as well as a protracted development and implementation period for novel technologies. Companies can obtain new technologies through Green M&A and swiftly incorporate them into their existing technology and business procedures. This allows for instant access to these solutions. As a result, transformation procedures toward a greener business have advanced significantly and can now be completed faster and cheaper than with internal innovation (Zhang et al, 2023).

Companies acquiring green technology through M&A can also improve the chance to increase operational efficiency by lowering energy consumption, carbon dioxide emissions into the atmosphere, and waste generation because of how business activities are organized. In order to integrate greener energy supplies right away, an energy company keeps buying businesses that generate electricity from renewable sources. The same is true for manufacturers that implement circular production technologies, which improve the sustainability of environmental effect and economic surplus by reducing the consumption of nonrenewable resources and producing little waste.

Green Mergers and Acquisitions are not limited to the purchase or integration of new technologies, but also involve the transfer of specialized skills, such as managerial knowledge and skills that can be integrated within the acquiring company.

Thanks to this integration process, the acquiring company has the opportunity to adapt more quickly to the use of the new technology, capable of bringing green benefits.

Therefore, this allows companies to reduce the time, and costs related to training, acquiring skills directly through the merger or acquisition agreement and accelerating the adoption and implementation of the technology. This facilitates a smoother and faster transition.

This is especially significant in highly technologically complex businesses, where specialist knowledge and abilities are essential to properly implementing new green solutions and maximizing the absorption and exploitation of the value of

acquired technology.

The potential for innovation they provide is another important factor propelling Green M&A. Not only can integrating new technology and abilities within an organization boost productivity and lessen its environmental effect, but it may also serve as a catalyst for new business opportunities. Businesses that purchase green technologies can utilize them to expand their product offerings, launch new sustainable product lines, and satisfy end users' growing demand for eco-friendly goods. All of this might lead to new direct sales opportunities and has a favorable effect on sales growth.

In terms of innovation, these remarkable activities assist businesses in cutting expenses and boosting eco-innovation productivity. Knowledge-based theory states that gaining new expertise and abilities is essential for gaining a competitive edge. Thus, over time, businesses in high-impact industries develop knowledge and skills related to production methods that are high in energy and emissions. On the other hand, green acquisitions enable an acquiring business to swiftly assimilate the experience and knowledge of the target business in sustainable production, green services, and green management. In conclusion, utilizing current technology lowers the likelihood of a technical malfunction and cuts the overall expense of developing new, sustainable technologies in half.

Furthermore, according to the notion of synergies in M&A, mergers and acquisitions can combine complementary resources and competencies of the two organizations, creating a "synergy effect" (1+1>2), that can make the outcome greater than the sum of its parts. Companies may easily obtain not just cutting-edge technology resources but also specific expertise in eco-innovation. As a result, they avoid spending money on skill development as outside parties can take advantage of newly developed skills and the financial risks associated with the "green" business's failure. Sustained skills development in this situation stays internal to another organization and is an endogenous process. In this case, the choice between "do it yourself" and "outsource to acquire skills" is settled in favor of the latter (Jingjing, 2021).

A concrete example of these dynamics is provided by some Chinese companies.
In recent years, many of them have adopted sustainable practices through Green Mergers and Acquisitions, thus obtaining new technologies in order to reduce emissions, improve energy efficiency and reduce operating costs.
In particular, some companies linked to the Chinese energy industry thanks to GMAs have obtained technologies capable of producing energy from renewable sources, while those linked to the manufacturing sector that have implemented this practice have integrated technologies in order to promote circular production and better waste management.
This has allowed them to optimize production processes and respond to the growing demand for eco-friendly solutions, accelerating their transition towards a more sustainable and green business (Chen et al, 2024).

2.4 Greenwashing

Greenwashing is an unfair practice that consists in presenting themselves as ecological, sustainable and ethical to maintain market consensus without bringing real changes in terms of environmental responsibility or social impact.
It literally means "to give a coat of green", in the sense of giving oneself a patina of environmental credibility.
This term was born in 1980, when the American Jay Westerveld denounced the campaigns of some hotel which invited customers to reuse towels to save water and energy while in reality they took no substantial steps to lower their environmental impact, using this approach primarily as a cost-cutting measure.
In recent years, the topic of sustainability has taken on a central and crucial role in corporate strategies, driven by growing pressure from investors, consumers and increasingly stringent regulations.
In this context, many companies demonstrate their commitment to Environmental, Social and Governance (ESG) issues, obtaining advantages in terms of reputation. However, not all initiatives undertaken by companies reflect real operational transformations, in fact some companies implement greenwashing behaviors.
A particular aspect of this dynamic emerges when the practice of greenwashing is intertwined with corporate acquisition and merger strategies, giving rise to the phenomenon of Green Mergers and Acquisitions (GMAs).
These operations, which involve the merger or acquisition of companies with high ESG ratings, can be interpreted as an opportunity to truly improve corporate practices from a strategic and sustainable point of view, but they can also be interpreted as a communication tool aimed at masking their own shortcomings in terms of sustainability, and obtaining subsidies or benefits from various governments (Nguyen et al, 2022)..
In light of this, it is possible to define greenwashing as the degree to which

companies fail to voluntarily comply with their environmental, social and governance (ESG) commitments.

Firms that truly focus on ESG issues have a number of advantages, including greater reputational appeal, a lower cost of capital and greater stakeholder engagement, which is essential to ensure long-term success.

Companies, especially those with a greater environmental impact, are often subject to continuous and increasing pressure from a wide range of stakeholders.

These pressures increasingly push companies to improve their performance towards more sustainable practices.

As a result, companies with poorer ESG performance are penalized and viewed badly by the market.

However, rather than actually solving the problem by adopting more sustainable practices, many companies resort to greenwashing by trying to appear as a green and socially responsible entity even if they are not.

In practice, the main motivation behind greenwashing is to make the market believe that the company's strategy to transform into a greener version is authentic and growing, even if, it has engaged in minimal restructuring necessary to maintain consumer and investor trust.

With regard to GMA, companies often use this strategy not so much to obtain benefits from the merger or acquisition itself, but rather only to implement greenwashing practices.

In this context, the practice of GMA becomes only and exclusively a way to improve the company's reputation in terms of communication with its stakeholders, the market and governments, without actually impacting operational practices.

On the contrary, in other scenarios, Green Mergers and Acquisitions represent a real opportunity for companies to move towards sustainable practices.

By integrating the technologies, skills and practices of the company with which it has decided to carry out this operation, the acquirer can improve its performance in terms of ESG.

Market perception therefore plays a key role in distinguishing between these two situations, and it would be crucial to verify whether companies are actually performing better in terms of environmental, social and governance (ESG) issues or whether they are simply using green mergers and acquisitions (GMA) as a greenwashing tactic to please external stakeholders without changing anything.
However, greenwashing operations, if recognized, rightly generate negative reactions, damaging the company's image.
This shows how delicate the relationship between greenwashing, green M&A and market perception is, and how crucial it is for companies to ensure transparency and consistency in their sustainability strategies.

2.5 Legal Framework

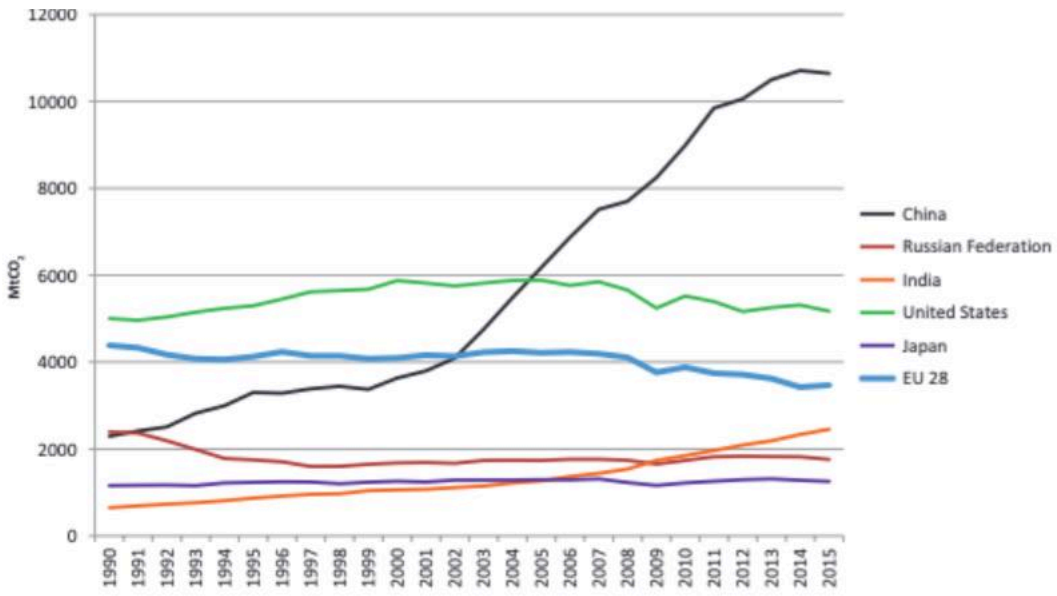
Green M&A represents one of the organizational responses to the growing and complex challenges posed by the new scenario of environmental sustainability and global regulations concerning the climate issue. Governments and prestigious organizations have joined a number of agreements and initiatives that define, and address issues related to, among other things, reducing greenhouse gas emissions, promoting renewable energy, and encouraging sustainable business practices as a result of the growing climate emergency. As a result, green mergers and acquisitions are an effective instrument that businesses may use to adjust to changing regulations and benefit from the growing green economy. Companies that engage in this kind of activity can get the technology, expertise, and know-how necessary to place themselves ahead of the curve in terms of regulatory compliance and to guarantee that their operations are environmentally sustainable. Adopting this practice also aids businesses in becoming recognized in the marketplace as they place a high priority on green innovation. Furthermore, several global and European Union frameworks provide incentives and competitive advantages to businesses committed to pursuing a decarbonization strategies. These include grants, tac credits, and other benefits that not only support compliance but also foster long-term growth.
These incentives highlight how GMAs act as a catalyst for continued and sustainable business expansion, combining legal compliance with economic opportunity.

2.5.1 Paris Agreement

"The Paris Agreement is a legally binding international treaty on climate change concluded between the member states of the United Nations Framework Convention on Climate Change (UNFCCC), regarding greenhouse gas emission reduction and finance. It was adopted by 196 Parties at the UN Climate Change Conference (COP21) in Paris on 12 December 2015, entered into force on 4 November 2016" (Wikipedia).
This agreement establishes a global framework to avoid dangerous climate change by limiting global warming to below 2 degrees with an effort to limit it to 1.5 degrees.
The reason for this decision is due to a study conducted by the United Nations Intergovernment Panel on Climate Change (IPCC), which states that exceeding the threshold of 1.5 degrees risks unleashing disastrous impacts on climate change, including droughts, heat waves and increasingly intense and frequent rainfall.
To limit global warming to 1.5 degrees, greenhouse gas emissions should peak by 2025 and decrease by 43% by 2030 (IPCC).
It also aims to strengthen the capacity of countries and consequently of companies, to address the impacts resulting from climate change.
As a result, governments agreed to:

- Keep the global average temperature increase to well below 2 degrees with an effort to limit the increase to 1.5 degrees.
- Ensure that global emissions peak as soon as possible. Emissions from fossil fuels from 1990 to 2015 are shown in the figure 2.3
- Subsequently achieve rapid reductions according to the best scientific knowledge, so as to achieve a balance between emissions and removals in the second half of the century

Fig. 2.4 Global CO2 emission from fossil fuel use, 1990-2015



Source: European Commission

Furthermore, the goals of the agreement set at COP 21 are the following:

- Reduce greenhouse gas emissions by at least 40% compared to 1990 levels
- Increase the share of energy consumption satisfied by renewable sources to at least 32%
- Improve energy efficiency by at least 32.5%

With the introduction of this agreement's legislative framework, businesses and governments are now compelled to take action to protect the environment and make sustainable decisions. According to Lu et al. (2022) Green Mergers and Acquisitions is seen as a key strategy used by businesses to counteract regulatory pressure and expedite the transition.
One of the main principles of the Paris Agreement is the reduction of carbon risk, that is, the danger of being reliant on technologies and manufacturing processes that depend on high CO_2 emissions. Because of their intensity, sectors like energy, transportation, and heavy industry have higher levels of CO2 emissions than other

industries, making them more vulnerable to carbon risk. Following the agreement's introduction, environmental laws have tightened, management emission costs have increased, and it is becoming more expensive to operate a traditional business in the competitive market. In order to stay competitive, established businesses must start exposing themselves to significant changes.

In the current environment, green M&A is one approach that businesses could take to quickly acquire green resources, technology, and talents. Green M&A is the process of swiftly obtaining the chance for businesses to obtain the green resources, technologies, and talents from businesses that specialize in sustainable solutions. Businesses would then be able to lower emissions, increase operational efficiency, and meet the targets set forth in the Paris Agreement. To finally lower its overall carbon footprint, an energy firm might, for instance, purchase a renewable energy company that uses solar or wind power and quickly incorporate such technologies into its operations.

By the end of the century, carbon emissions must be zero, per the Paris Climate Agreement. Consequently, practically all economic activity will be impacted, which means that every firm would be impacted. Organizations will have to function in a new regulatory and market context, and nothing will be the same as it was. In this case, the benefit of green M&A is that it can help businesses quickly acquire technologies, expertise, and carbon-reduction projects. Businesses will be prepared for the upcoming regulatory problems associated with climate services in this way.

Furthermore, the Paris Agreement has encouraged green M&A activities due to financial concerns as well as regulatory concerns. heightened investor demand for ESG Generally speaking, investors seem to find more attractive businesses that are more sustainable. High ESG scores are gained by acquisitions and mergers, and organizations who engage in these kinds of mergers or are not change-averse receive better financing terms. As was already mentioned in the preceding paragraphs, it is plausible to argue that businesses employ green M&As among other things to strengthen their sustainable reputation and get a stronger position

in the ESG investment market.

An additional advantage is the ability to access new emerging markets related to sustainability. The Paris Agreement has created significant demand for renewable energy solutions, energy efficiency, and low-emission technologies in many areas of the world. Companies buying green technology also have the opportunity to expand into these markets, benefiting from new growth opportunities. For example, the renewable energy industry has observed a boom in mergers and acquisitions, with companies seeking to consolidate their presence in a fast-growing market supported by supportive government attributes and growing environmental awareness.

According to Porter's hypothesis, environmental regulations, like the one outlined in the Paris Agreement, can foster rather than impede corporate innovation. More regulations aimed at protecting the environment specifically motivate business activity in two ways. First, in reaction to current rules, it compels businesses to create and improve cleaner production techniques. Second, given the shifting power dynamics across enterprises, it encourages wider and more widespread innovation. Additionally, companies want to swiftly and affordably acquire cleaning and efficiency skills in order to comply with strict regulatory instruments. Put differently, the strain resulting from environmental legislation is what propels business activity and renewable innovation. Moreover, GMA transactions give businesses the chance to reduce their residual emissions, exchange and convert trash, and improve their water and energy efficiency. Furthermore, mergers and acquisitions can encourage technical and/or organizational innovation to help businesses and employees develop beyond the bounds of long-term, unsustainable economic growth, which reduces the need for additional regulations.

So, the Paris Agreement encouraged the use of green mergers and acquisitions (M&As) to speed up the shift to more sustainable business models. These transactions lower innovation costs by acquiring proven technologies, boost a company's competitiveness by making it more efficient, and align it with international regulations. Businesses that use M&As achieve global environmental

targets while reaping the benefits of enhanced investor appeal, enhanced reputation, and strengthened competitive positioning in a setting where sustainability has become a strategic priority for governments, investors, and consumers.

2.5.2 European Green Deal

In December 2019, the European Commission published the European Green Deal, a growth strategy to transform the problems and challenges of climate change into opportunities.

The principles on which it is based are the following:

- Be carbon neutral by 2050.
- Economic growth must be decoupled from the use of resources.
- No person and no place are left behind in this transition

It is therefore possible to define the Green Deal as a growth strategy that aims to transform the EU into a fair and prosperous society, with an advanced and modern economy, efficient from the point of view of resources and carbon neutral. The European Green Deal provides a regulatory and policy framework that pushes companies to invest in green technologies and reduce their carbon emissions. Green M&A is a key tool for companies wishing to achieve the sustainability goals of the Green Deal. Through such deals, Companies can quickly acquire green skills and technologies, improving energy efficiency and, consequently, competitiveness within the European market. In addition, the Green Deal offers economic incentives by allowing green companies to access funds and financing for green transition, making green M&As an even more advantageous option for companies eager to expand into emerging sectors, such as electric renewables or mobility. As a result, green mergers not only help companies better comply with regulations, but also make them sustainable innovation leaders by enabling them to gain a competitive advantage within the European economic system. Therefore, it is possible to argue that the European Green Deal effort and the

concept of Green Mergers and Acquisitions are strongly related. The ambitious aim of this 2019 European Union project is to make Europe the first continent to be carbon neutral by 2050. This objective calls for a dramatic overhaul of the European economy, particularly in the areas of transportation, manufacturing, energy, and agriculture. As a result, green M&A is an effective instrument for accelerating this shift by assisting businesses in acquiring the resources, technologies, and expertise necessary to meet the climate targets of the EU. The Green Deal places a strong emphasis on technological innovation and uptake of environmentally friendly solutions. Since many businesses operate in high-carbon environments, like the manufacturing or energy sectors, it's critical to lower greenhouse gas emissions. Green mergers and acquisitions can assist these businesses in swiftly acquiring the technologies required in this regard and enhancing their competitiveness. For instance, adding a renewable energy company to the portfolio could help diversify it and lessen the company's adverse effects in the traditional energy sector.

When it comes to evaluating mergers and making sure that green M&A aligns with the objectives of the Green Deal, European antitrust authorities are crucial. The authorities are required to evaluate how mergers affect innovation and sustainability in addition to competition. Institutionally, antitrust regulators may choose to accept a merger transaction if it results in considerable efficiency and sustainability gains that directly support the climate goals of the European Union, especially in situations where competition may be constrained. Mergers with sustainable technological orientation may also be viewed as advantageous to competition since they enhance product quality and foster green innovation (Modrall, 2021).

Businesses, that engage in green technologies through mergers and acquisitions (M&A), enhance their brand and align with the tastes of more ecologically conscious customers. In addition, European authorities are actively consulting on how to incorporate sustainability benefits into merger assessments so that M&As don't limit consumer options for sustainable technologies or green products.

To clear up, the European Green Deal and Green M&A are closely linked as they both focus on hastening the shift to a more sustainable economy. Specifically, businesses are encouraged to invest in green technology by the Green Deal legal framework, and green acquisitions offer a speedy way to obtain this technology.
The 2024 State of Energy Union Report finds that EU has managed to address critical risks to security of its energy supply, bring energy markets and prices under control and accelerate the transition to climate neutrality.
The annual report takes stock of the EU's progress over the period 2023-2024 towards the objectives of the Energy Union, the "RePowerEu" plan to reduce dependence on Russian fossil fuels and the clean energy transition.
For consumers, measures taken at EU level to tackle the energy crisis have paid off and electricity and gas prices have fallen drastically compared to the peaks in 2022. New energy market legislation, such as the reformed EU Electricity Market Design, means that the most vulnerable are also better protected from disconnection. In the event of a natural gas price crisis, EU countries can now introduce measures to protect consumers and ensure access to affordable energy and essential social services.
Significant progress has been made in the renewable energy sector. In the first half of 2024 alone, half of the European Union's total electricity was generated from renewable sources, with wind power overtaking gas to become the second largest energy source after nuclear.
In addition, significant progress has also been made between 1990 and 2022 in terms of greenhouse gas emissions, which have decreased by 32.5%.
However, despite the improvements, there are areas where more effort is needed. In order to achieve the target of reducing final energy consumption by 11.7% by 2023, the EU must step up efforts to optimize energy efficiency.
In particular, there is a need to increase the electrification of heating systems and accelerate the pace of building renovation.
In conclusion, the European Green Deal plays a fundamental role in guiding the transition in Europe towards a sustainable economy capable of not generating

emissions, while at the same time offering companies economic tools and incentives to compete in a market increasingly oriented towards sustainability. In this context, also in Europe, GMAs represent a strategic tool, giving companies the opportunity to acquire green technologies and crucial skills to face the climate challenge and adapt to community objectives.

Although there has been much progress made so far, as highlighted in the paragraph, there remain critical areas linked in particular to energy efficiency.

CHAPTER 3: The Gezhouba Group Case: Green Mergers and Acquisitions in the Highly Polluting Enterprise Sector

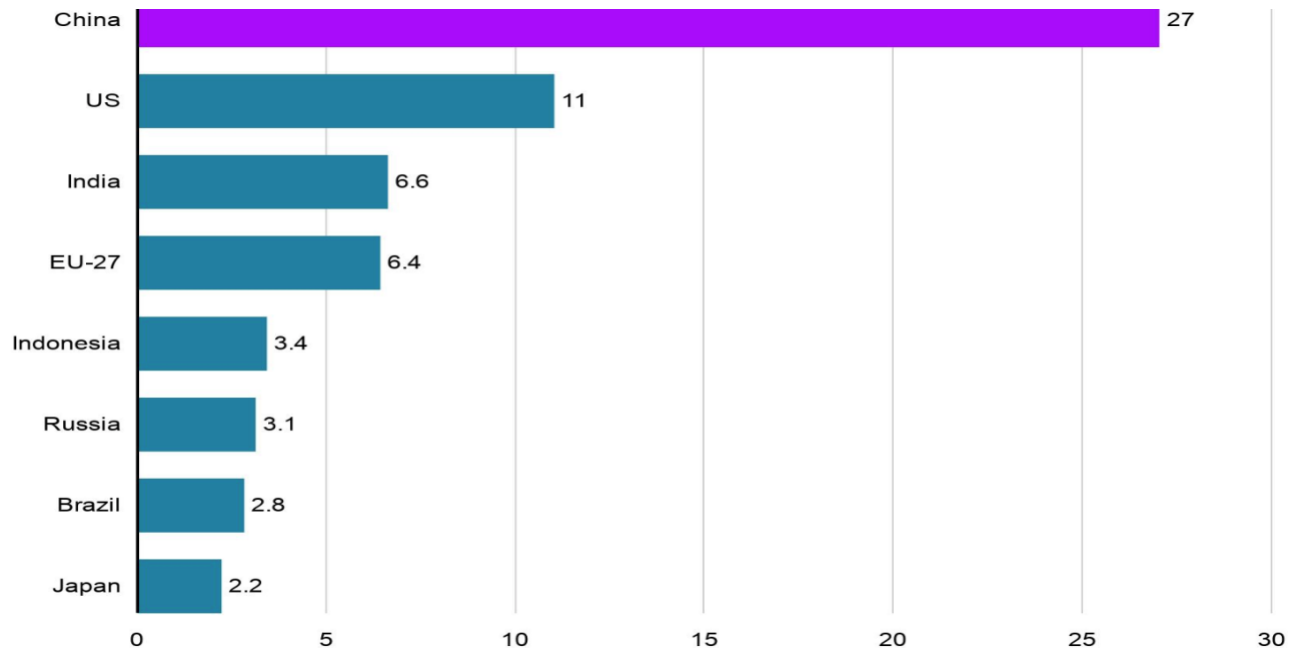
3.1 Introduction

Increased concern about ecological problems and climate change globally has led to unprecedented interest in sustainable practices in business. In this context, Green Mergers and Acquisitions have emerged as key business strategies with particular reference to China, where extremely rapid industrialization has caused high levels of greenhouse gas emissions and pollution. China is currently the most polluted country globally and the 9.9 billion tons of CO2 emitted is largely the result of consumer goods exports and coal use. Chinese companies are using sustainable Mergers and Acquisitions strategies in an attempt to reduce the impact of climate change and also to improve their reputation within the global market and become more efficient in their operations. The Chinese government has set an ambitious target for itself: being carbon neutral by 2060. A significant shift in industrial and resource management techniques is required to achieve this goal. The adoption of this change is being facilitated by government policies, which establish favorable conditions for businesses that choose to follow these guidelines. The government is promoting mergers and acquisitions that carry out this mission, i.e., investing in and going green, by using both financial incentives and stringent restrictions. Chinese companies, acquiring or merging with other companies that are already engaged in sustainability practices, can not only reduce their operating costs but also become more energy efficient and ultimately more innovative. This method is not only economically useful but is crucial for maintaining competitiveness in today's market largely centered on sustainability and compliance with environmental regulations.

3.1.1 Chinese context and policies adopted

The environmental issues, that are becoming more and more the responsibility of humanity, provide the biggest obstacle for any modern administration. Like other countries, the People's Republic of China is dealing with serious environmental issues, many of which are already at a catastrophic stage.
Currently China is the world's biggest energy consumer, a major producer of air and water pollution and the world's top emitter of greenhouse gases.
Water pollution has reached alarming levels, with some of the country's most important waterways, such as the Yangtze River, China's longest, continuing to receive industrial waste, agricultural runoff and urban sewage.
China has some of the worst air quality in the world because of its densely populated eastern region, which also has a high economic density.
The rapid industrialization that began in the late 20th century has driven massive economic growth but also led to significant environmental degradation.
A study conducted by Rhodium Group shows how in 2019 China accounts for 27% of the world's CO2 emissions, which is more than the combined emissions of the US and Europe (Fig. 3.1).
Over the past three decades, the Asian giant's emissions have more than tripled. This increase is the result of the country's rapid industrial development and impressive economic expansion, accompanied by increasing demand for energy to support its growing population and accelerating urbanization.

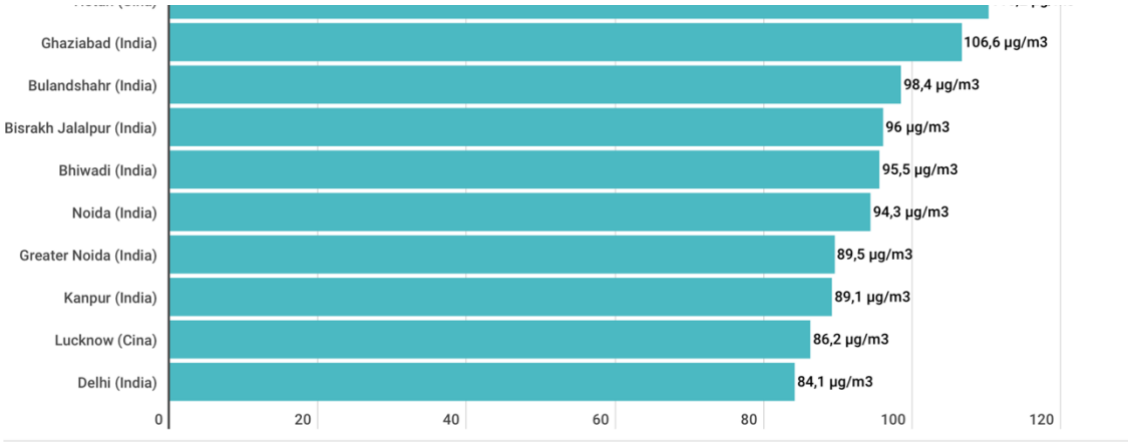
Fig. 3.1 Greenhouses gas emission in 2019 (%)



Source: Rhodium Group

Polluting enterprises that emit enormous amounts of CO2 into the atmosphere also contribute to this, which has detrimental effects on the environment and the world economy in addition to being unhealthy for residents.
In recent times, air pollution has been a defining feature of the Asian continent, accounting for the proportion of cities with the worse air quality worldwide. Up until a few years ago, in fact, many Asian cities (Fig.3.2), including many Chinese settlements, suffered from one of the worst eras of air pollution.

Fig. 3.2: Most polluted cities in the world



Source: TRUENUMB3RS

China's extremely quick economic growth has been one of the key causes of the environmental catastrophe there. Economic development has long been considered a priority over environmental effects, allowing ample room for profitable and productive ventures. Much of this growth has been driven by the ongoing mining of fossil resources, with coal serving as the primary energy source. Coal accounted for 76.2% of China's energy consumption in 1990; although this share has gradually decreased, it still makes up 57.7% of the nation's energy consumption in 2019 (China Power).

The rapid population expansion that is currently occurring in China is another significant element that has accelerated environmental deterioration. Because of this, an increasing number of people from rural areas have moved to large cities, even at the most rapid stage of economic expansion. In addition, a growing number of the newly arrived city dwellers are traveling by private vehicle, which increases air pollution and releases a lot of CO2s.

In terms of the policies enacted, China became the 23rd member to ratify the Paris Agreement (PA) in 2016.

Each signatory to the PA declares their intention to cut emissions and provide

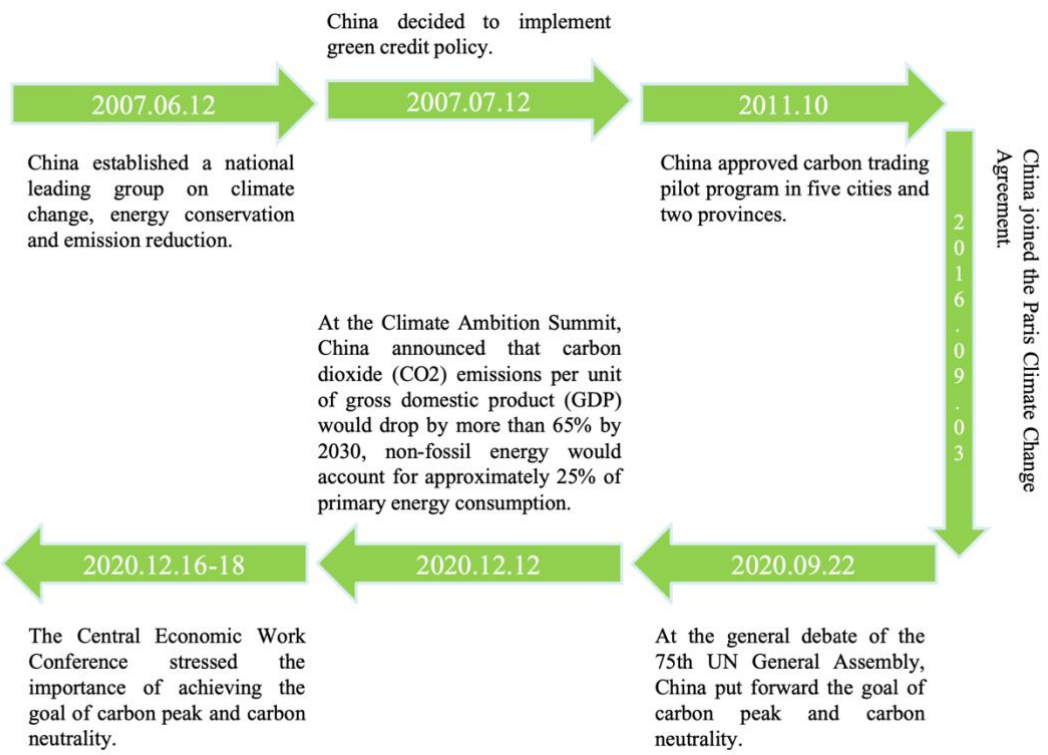
Nationally Determined Contributions (NDCs) every five years. NDCs are voluntary commitments established by each country to reduce greenhouse gas emissions and address climate change, reflecting their efforts to meet the global goals of the agreement.

China has taken the lead in pursuing green transformation alongside economic growth, following the overall trend of low-carbon and green development in the face of an increasingly complicated socioeconomic global environment. China's plan to become carbon neutral by 2060, and reach its carbon peak by 2030, is an effort to strengthen the PA. It shows China's accountability as a big power and quickens the pace at which the world is moving toward the PA's targets for global temperature.

China, having the second largest economy in the world, is crucial to the worldwide shift toward a low-carbon green economy.

Since 2007, China has implemented the following significant policies to address climate change and cut carbon emissions (Fig. 3.3). (Zhao et al.,2022).

Fig. 3.3: Carbon emission reduction measures in China from 2007 to 2020

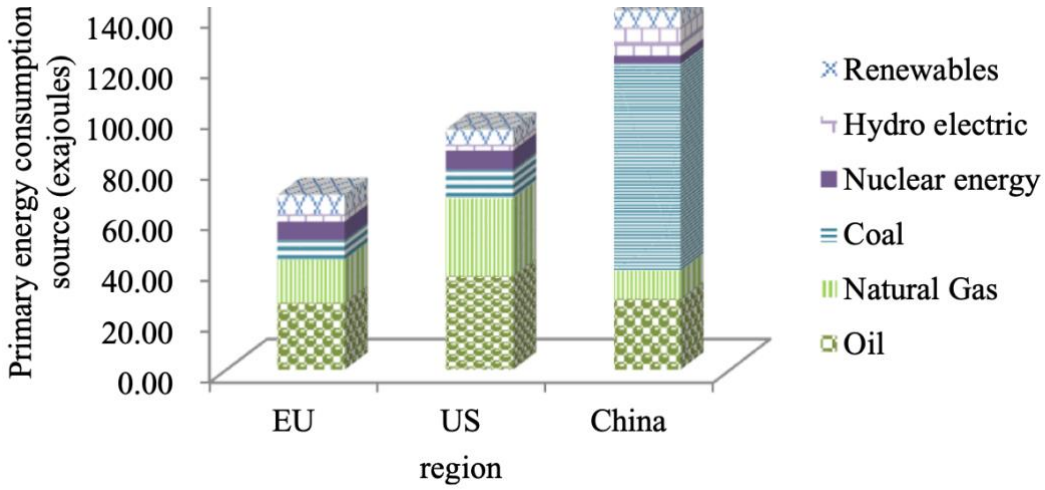


Source: Science Direct

The "National Leading Group on Climate Change, Energy Conservation and Emission Reduction" was founded by China on June 12, 2007, with the goals of coordinating efforts, resolving important difficulties and making unified plans to handle these three areas.
Furthermore, China approved a carbon trading policy in Beijing, Shanghai, Tianjin, Chongqing, Hubei, Guangdong, and Shenzhen in October 2011 in an effort to reduce greenhouse gases (GHGs), particularly carbon dioxide, from energy consumption. This created carbon emission trading mechanisms with distinctive Chinese characteristics (regional adaption, strong state control and focus on key sectors) and used market mechanisms to achieve low-carbon development.

China joined the PA on September 3, 2016, demonstrating its support for the international effort to lower greenhouse gas emissions and improve the world's ability to adapt to climate change.
Chinese President Xi Jinping suggested raising the level of NDCs and implementing more sensible policies and actions to reach peak CO2 emissions by 2030 and become carbon neutral by 2060.
At the Climate Ambition Summit, organized by United Nations and held virtually as a result of the Coronavirus-19 emergency, on December 12, 2020, President Xi declared that China would reduce its carbon dioxide emissions per GDP unit by more than 65% by 2030, that non-fossil energy would make up around 25% of primary energy consumption, that the country's forest stock would increase by 6 billion m3 over 2005 levels and that the country's wind and solar power capacities would surpass 1.2 billion kilowatts.
At the Central Economic Work Conference in Beijing, which took place from December 16 to18, 2020, emphasis was placed on reaching carbon neutrality and the peak of carbon emissions, creating an action plan to reach the peak by 2030 and assisting local governments in pursuing this goal (Zhao et al., 2022).
China will only have a transition period of roughly 30 years after achieving its carbon peak to reach carbon neutrality by 2060.
It must therefore achieve in 30 years what Western nations have achieved in 60, which suggests significant obstacles.
This challenges is even more difficult because a large portion of China's energy consumption structure comes from fossil fuels, and the country has a low energy utilization efficiency.
China's, the US's, and the EU's combined primary energy consumption is compared in Figure 3.4.

Fig. 3.4: Primary energy consumption of the EU, US and China



Source: Science Direct

China is the country with the highest energy consumption, particularly in terms of coal consumption, which makes up 57.64% of total energy consumption, compared to 11.18% and 11.98% for the US and the EU. In contrast to wealthy nations, China's manufacturing and industrial sectors make up a sizable portion of its economy, and the country consumes up to 1.5 times as much energy per GDP as the world as a whole. China's environmental goals therefore face a significant challenge in effectively increasing energy consumption efficiency and encouraging energy conservation and emission reduction. It would need to cut its net carbon emissions from 10 billion tons to 0 billion tons in 40 years in order to become carbon neutral by 2060, but it has the biggest energy system in the world, with fossil fuels providing around 85% of its main energy. In order to reach this goal, China needs a three-step process that consists of carbon peak, carbon slowdown, and carbon neutrality. Between 2021 and 2030, China is expected to reach the first stage, the carbon peak. During this period the economy will continue to be dominated by secondary industry.

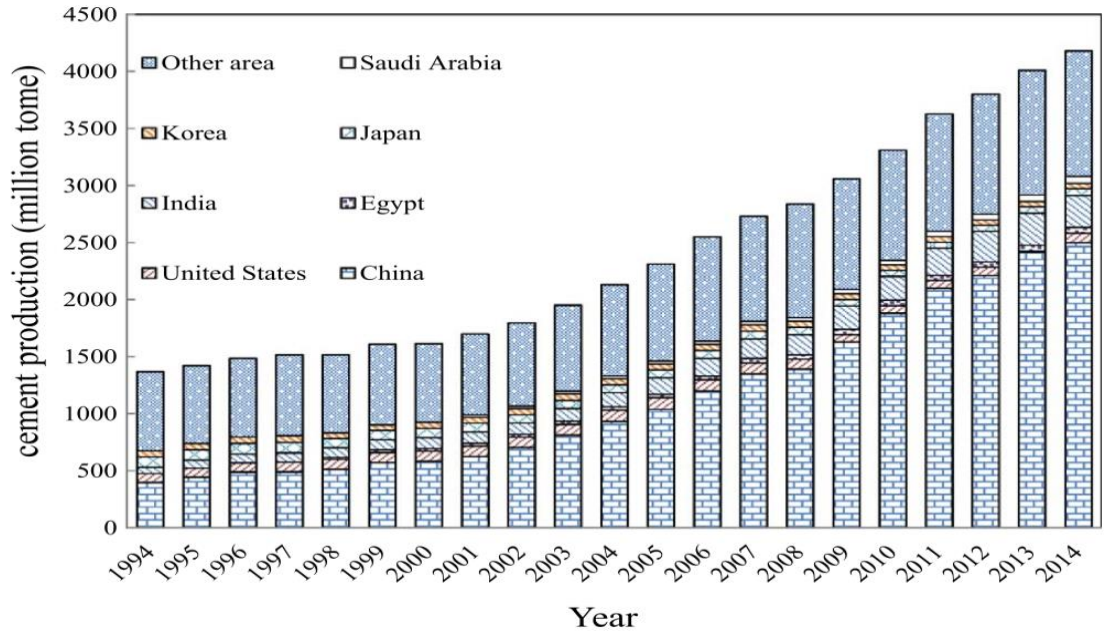
As a result, energy consumption and carbon emissions, particularly those related to transportation, should rise in tandem with industrialization, and it will be

challenging to reverse this trend.
China's primary goal in this stage is to convert its high-carbon economy into a low-carbon economy in order to reach its carbon peak in 2030. To do this, it must control the amount of coal it uses, reduce energy consumption, improve the efficiency of its energy use (particularly that of residents and industrial enterprises), develop clean and renewable energy, encourage energy conservation, lower its CO2 emissions, and support green energy vehicles.
Carbon deceleration, which will occur between 2031 and 2040, is the second stage. China must achieve carbon neutrality within 30 years of achieving its carbon peak. It should therefore drastically cut its carbon emissions between 2031 and 2040 in order to lessen the reliance of its industry, economy, and social structure on carbon.
Carbon neutrality, the third stage, would occur between 2041 and 2060 (Zhao et al., 2022).

3.2 Chinese cement industry

In the global economy, the cement sector plays a significant role in heavy manufacturing and is essential to the development of buildings, infrastructure and technical projects. One of the most commonly used materials in the world, cement is made through a complicated process that involves burning limestone and other ingredients in very hot, highly efficient kilns, which produces a large number of pollutants. Being one of the major heavy industry sectors, the cement industry really has a strongly negative environmental impact.
The cement business is a significant contributor to the release of greenhouse gases and carbon dioxide since it is extremely energy-intensive and polluting. In actuality, sulfur, nitrogen oxides and carbon dioxide are produced by the cement industry.
According to several reports from International Energy Agency (IEA) and Environmental Protection Agency (EPA) the cement industry is the world's second-largest producer of carbon dioxide, making up roughly 6-8 % of all carbon emissions worldwide, right behind the energy sector. The cement industry uses between 12 and 15 % of the energy used in industrial processes worldwide. The world population has grown from 1.5 billion to 8 billion people in the last century, with slightly more than 3 billion of those people living in cities. Cement consumption has increased significantly due to population growth and of the fast urbanization, particularly in developing nations.
As a result, the development of modern societies' infrastructure is significantly influenced by the cement industry (Shen et al., 2017).
Figure 3.5 shows the increase in cement production over the time period from 1994 to 2014. It is possible to notice how predominantly developing countries, such as China and India, cement production has continued to increase more and more.

Fig.3.5 Cement production from 1994 to 2014

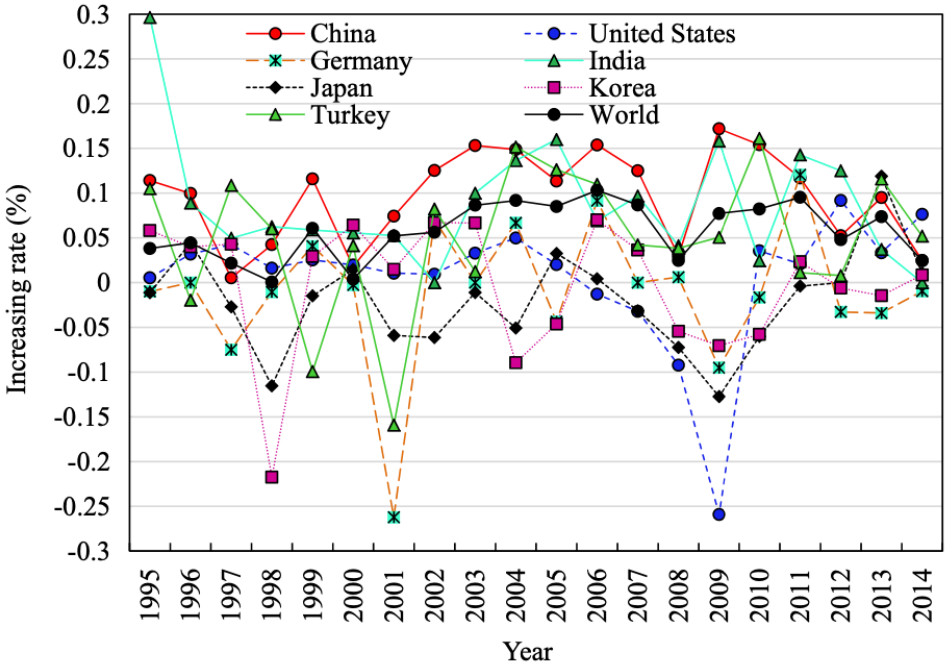


Source: Science Direct

Global cement production in 2014 was estimated to be 4.18 Gigaton (Gt). As of 2014, 2.48 Gt of cement were manufactured in China, making up almost 60% of the world's total cement production. China has been the world's largest manufacturer of cement since 1985. China is a developing nation, therefore in some ways, the growth of its cement sector is abnormal. China has been producing a disproportionate amount of cement during the last 20 years, and it still leads the world in this regard. From 400 million tonnes to nearly 2.5 billion tonnes, production has grown about sixfold. Significant progress has been made in cement technology and equipment throughout this time. China's rapid economic expansion is a reflection of the nation's unrelenting urbanization and industrialization, which has increased demand for infrastructure like buildings, railroads, and highways. Because of this, the need for cement, a crucial building material, is still high.

Since the implementation of economic reforms in the late 1970s, China has seen a notable urban expansion. Compared to 26% in 1990, approximately 54.7% of people resided in metropolitan areas in 2014.
Though China's population is expected to decline, urbanization will continue, even if at a slower pace in the upcoming decades.
The Chinese government continues to prioritize metropolitan area redevelopment together with the modernization and enhancement of public infrastructure, including drainage and transportation systems.
So, growing of population, rapid industrialization and urbanizations are the main causes of the increased cement production. This happens as a result of the infrastructure that needs to be built in tandem with urbanization and industrialization.
Fig. 3.6 shows how the rate of cement output has increased in several nations from 1995 to 2014. It is evident that China experiences the fastest pace of growth most of the time. In general, a nation’s pace of increase in cement output is influenced by its economic circumstances; for instance, during the economic crises of 1998, 2001, 2008, and 2009, there was a notable decline in cement production. However, despite the government’s policy of supporting the economy through infrastructure expenditure, China’s cement production did not decline (Liang et al, 2022).

Fig. 3.6 Cement interesting rate from 1995 to 2014

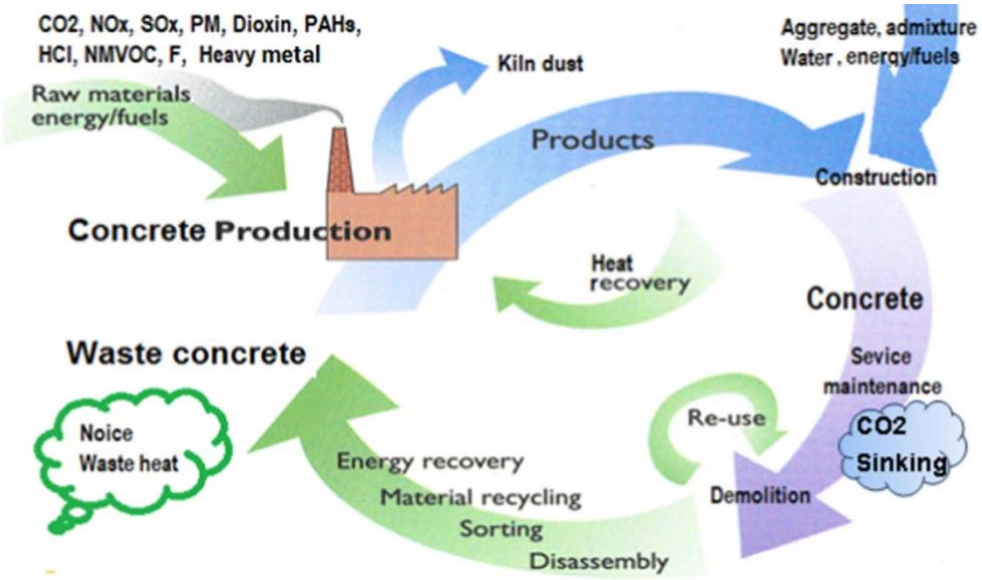


Source: Science Direct

3.2.1 The Ecological Footprint of China's Cement Industry

The world's largest manufacturing process with the greatest material flow is cement production and it has a significant negative influence on the environment. In its life cycle a large number of raw materials, energy and fuels are required as inputs, while various pollutants, by products, and waste are released at the end of the cycle as outputs (Fig .3.7, Shen et al.,2017).

Fig. 3.7 The footprint impact of cement in its lifecycle

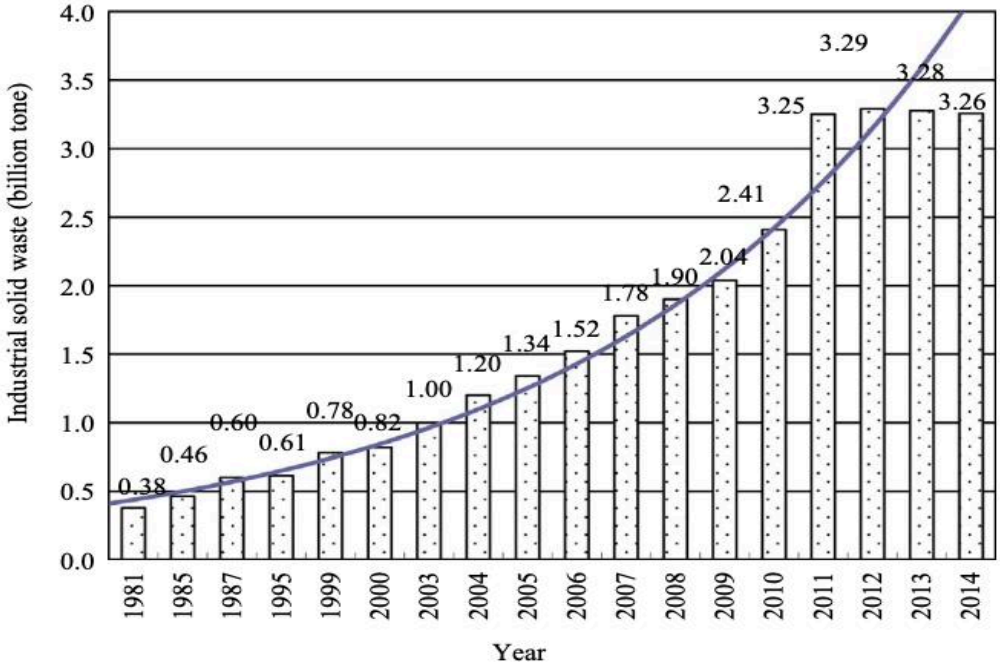


Source: Science Direct

The cement industry is one of the most environmentally harmful and a major contributor to global warming due to the vast volumes of materials and solid waste that are transported and emitted during the production process. However, in recent years, the gas emissions have been significantly reduced by optimizing existing and proven technologies and introducing new technologies to the cement industry, substituted partly some materials (i.e. the calcium raw material is substituted partly by acetylene sludge), using renewable energy. The cement industry, although often considered a sector with a strong negative

environmental impact, does not always turn out to be a burden to the environment. It can play a positive role thanks to the possibility to reuse a large amount of solid waste in different ways.
This has a significative impact, especially in China that produces enormous amounts of solid waste throughout the production processes of raw materials and consumers good (Fig.3.7).

Fig. 3.7 Industrial solid waste in China from 1981 to 2014



Source: Science Direct

In fact, such waste can be used as raw materials, replacing traditional materials such as limestone, or as an alternative fuel, reducing dependence on fossil fuels. Furthermore, additional materials such as steel slag or fly ash are incorporated into cement production to improve its properties.
Thanks to these processes, the cement industry contributes significantly to the reduction of waste, preventing it from ending up in landfill or causing further pollution. This practice allows to reduce the environmental impact and also to promote a clean production model, making the industrial system more sustainable.

In this way the cement sector demonstrates that, if managed responsibly, it can transform waste into valuable resources, offering advantages for the environment and the industry itself (Shen et al, 2017).
Environmental conservation has been made a fundamental national policy by the Chinese government in an effort to reconcile the increasingly severe conflict between environmental preservation and economic development.
A number of policies have been enacted one after the other and the application of particular measures like tax and fee reductions, credit incentives and financial subsidies, has helped industrial enterprises, including those that produce large amounts of pollution, optimizing their industrial structures and accomplish green development. The general public's knowledge of environmental protection is also progressively growing, and social supervision and media reports are leading the informal environmental regulation that is crucial in encouraging businesses to accomplish green transformation and upgrading.
From the standpoint of the businesses themselves, heavy industry enterprises face issues including excessive energy consumption and pollution, which not only contribute to environmental contamination but also impede the long-term profitability of the operations. Due to internal and external issues, businesses are gradually abandoning their traditional manufacturing model, which polluted the environment in the process, and turning to green development as their only option.
The construction cement industry in China has reached overcapacity in recent years, so it is critical to optimize the industry structure and undertake industry transformation and upgrading.
Simultaneously, the implementation of several environmental regulations is compelling the industry to eradicate underperforming production capabilities and foster the green transformation of the sector. Construction companies who use outdated technology, produce subpar work, and cause significant pollution will be forced out of business. The future of the construction industry will be shaped by a focus on safety, sustainability, and recycling as primary development priorities Lu, 2022.

3.3 Green Mergers and Acquisitions in China

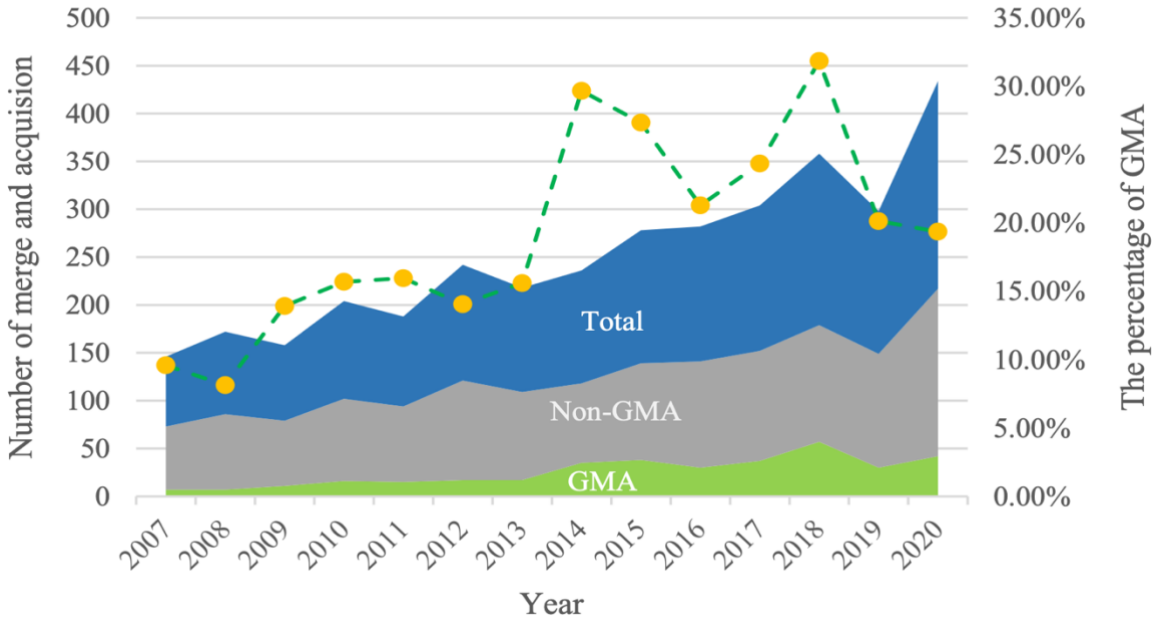
Green Mergers and Acquisitions are becoming more and more common in China to support sustainable growth and accelerate the shift to more ecologically industrial processes.
Companies, particularly those in pollution-heavy sectors like the cement industry, consider GMAs as a chance to quickly obtain environmentally friendly resources and technology that would reduce their environmental effect and increase their competitiveness in the market. While small and medium companies are starting their transition to the green economy through simpler local mergers, some big firms are trying to attain sustainability targets through intricate cross-border acquisitions. In an effort to fulfill the ambitious environmental targets defined in the 14th Five-Year Plan, the Chinese Government is actively promoting this process of sustainable industrial consolidation through GMAs.
It is possible to consider two principal approaches that companies can use for green and sustainable development:

- The acquisition of green resources from other businesses through mergers and acquisitions
- Internal investments in environmental protection and to develop products or processes that are helpful in lowering environmental pollution, improving energy savings, and reducing emissions (Zhang et al., 2023).

Compared to internal solutions, that requires long timelines and may generate uncertain results, GMAs offer a faster way for companies to acquire green technologies enhancing the quality of their assets.
Furthermore, GMAs help organizations respond to stakeholder needs more

effectively, expediting the process of green business transformation and allowing them to become competitive in the sustainability space more quickly. According to a study published by ScienceDirect, it has been shown that since 2012, the proportion of Green Mergers and Acquisitions (GMAs) of heavy pollution firms in China has significantly increased with the average percentage of 15% in 2006–2012 to 25% in 2012–2018 (Fig. 3.8).

Fig. 3.8 Annual Distribution of GMA of heavy pollution firms in China from 2007 to 2020



Source: Science Direct

Over thirty percent of businesses in highly polluting industries have opted to do Green Mergers and Acquisitions.

The idea of green development has become more and more attractive, and consequently even more companies are favoring Green Mergers and Acquisitions as a market economic strategy.

This is particularly the case for heavily polluting businesses like the construction

cement sector. It is a crucial method for promptly realizing the green development of business.

The advantages of Green Mergers and Acquisitions include solid targets, minimal time and great certainty all of which can assist businesses in acquiring green resources quickly, effectively and precisely. Taking advantage of green resources and securing a competitive edge can be achieved by significantly polluting corporations through green mergers and acquisitions (Xu et al,2024). Furthermore, GMAs can encourage businesses to invest more in environmental protection and can help them accomplish green transformation and upgrading. By the end it is possible to say that not every business can increase performance through Green Mergers and Acquisitions because, according to a study conducted in China by Wang et al. (2024), the final result is also due by internal and external factors.

For example, some of them are:

- Impact of internal factors: good corporate governance improves both financial and market performance related to mergers and acquisitions (M&A). Companies with strong and transparent management structures tend to perform better in their M&A processes. However, overconfidence in executive could have a negative impact on GMAs performance, because executives who are too confident in their decisions may underestimate the risks or overestimate the benefits of the operations.
- Impact of external factors: Uncertain economic policy can have a positive effect on GMAs processes. This may happen because, in situations of uncertainty, companies could adapt better and develop more innovative and flexible strategies, improving their ability to develop GMAs practice. Another factor could be the institutional distance between countries, companies from two countries with cultural and regulatory differences may encounter greater difficulty in implementing the GMA process.

3.4 Gezhouba Group study case

3.4.1 The company

China Gezhouba Group Company Limited, headquartered in Wuhan, the provincial capital of Hubei, is considered as one of the nation's top engineering and construction firms, placed 33rd in the world's largest industry players by revenue in 2014.

The major shareholder of the company is China Gezhouba Group Corporation, a state-owned company that is member of the China Energy Engineering Corporation group, owns 40.8% of the company (Wikipedia).

Gezhouba is a construction company specialized in building roads, bridges, dams, power plants, and other infrastructure projects in China and abroad. It has also made investments in real estate development, construction, hydropower generation, civil cement, and explosives.

Gezhouba is also devoting its forces to improving sustainability by promoting internationalization and adopting greener practices in its infrastructure projects. The company has entered into numerous cooperation agreements, such as one with China EXIM Bank (one of the three institutional banks, founded to support the export of Chinese products and service), to finance its abroad initiatives, thereby strengthening its presence in more than sixty countries.

The Gezhouba Group, which began by concentrating on major infrastructure and building projects, has grown significantly throughout the world to rank among China's top engineering conglomerates. The company's involvement in important

projects like the Three Gorges Dam, the world's largest power station by installed capacity of 22.500 MW (Fig.3.9), in Hubei region, attests to its exceptional capacity for managing intricate, high-tech undertakings

Figure 1Fig. 3.9 Three Gorges Dam

Source: Business Insider

Gezhouba has expanded its operations over time, moving into important industries like real estate development, building roads and bridges, and hydropower generating, However its fundamental activity continues to be building large-scale infrastructure projects that influence China's and other countries' futures. One of its goals is also to find a difficult balance between economic growth and respect for the environment, making large multilateral arrangements an essential tool for acquiring new technological solutions and low-impact resources. The Gezhouba firm has responded to global environmental sustainability and ongoing climate change problems over the years. The company has incorporated greener techniques into its operations as a result of government and stakeholder pressure, as well as more stringent green requirements.
In response to these new requirements, Gezhouba implemented a Green Mergers and Acquisitions (GMAs) strategy, which is a crucial tool for quickening the shift

to eco-friendly technologies. This approach has helped the business to increase its energy efficiency while also enabling it to maintain its competitiveness in a rapidly changing industry.

Gezhouba can effectively obtain new knowledge and innovations in environmental protection, like as green infrastructure and renewable energy, through sustainable mergers and acquisitions. These kinds of deals have also made it easier for the business to enter international markets and have strengthened its position as the industry leader in environmentally friendly infrastructure. This change is coherent with the sustainable development objectives that the Chinese government is pushing, which are to boost clean energy and lower carbon emissions. Although several recent acquisitions have contributed special knowledge of cutting-edge technology, maintaining the environmental balance in expansion continues to be the largest problem.

Apart from sustainability responsibilities, environmentally conscious purchases give Gezhouba the chance to satisfy investors' and customers' demands, who are increasingly committed to supporting businesses that demonstrate a firm commitment to reduce their environmental effect. The group's environmental firms have improved its reputation and allowed it to access more eco-friendly markets and diversify its portfolio of projects.

Gezhouba has been a leader in driving the transition to a more sustainable future, using strategic acquisitions to drive long-term economic growth and strengthen its competitiveness. This commitment underlines the company's growing focus on sustainability as a central pillar of its operations.

3.4.2 The acquisition of Kardan Water

In 2015, China Gezhouba Group Investment Holding Co. Ltd. (CGGC Investment), a subsidiary of China Gezhouba Group Company Limited (CGGC), acquired Hong Kong-based Kardan Water International Group (KWIG), a wholly owned subsidiary of Tahal Group, a multinational engineering company with headquarters in Amsterdam. This acquisition was made on behalf of CGGC Limited, marking a significant step in the company's expansion into the water infrastructure market.
The goal was to improve the company's position in the field of sustainable water-related technologies and practices. This $102 million deal represented a notable development in the field of Green Mergers and Acquisitions.
The Chinese company showed a strong commitment to integrating important assets required to address China's water management concerns, including covering KWIG's existing debt in addition to the stock purchase. By gaining control over 11 water-related projects through this acquisition, Gezhouba enhanced its position as a leader in the sustainable infrastructure industry.
The Gezhouba Group's environmentally conscious mergers and acquisitions are motivated by both internal and external factors.
Regard the external factors, companies are often subject to pressure from the external macroeconomic environment, which includes numerous political, economic, social and technological variables that are constantly evolving (Jiao et al, 2020). Recently, the Chinese government's introduction of even more stringent environmental policies has forced companies in the sector to rapidly adjust their production processes and management models.
At the same time, the implementation of measures such as the "Law on Ten

Actions for Water" (introduced by the Chinese government to address water pollution and ensure sustainable management of water resources) and the "Regulation on Ten Actions for Air" (aims to combat air pollution, a significant problem in many Chinese cities) has helped to regulate the sector, encouraging its development, especially in the crucial area of water resources (Zhang et al., 2023).

The purchase of Kardan Water by Gezhouba Group is more than a simple response to strict environmental rules, it's a chance to enhance and reorganize the corporate structure to make it more effective and leaner. By doing this, the business is able to strengthen its position in the water sector and help safeguard water resources. Gezhouba Group will be able to successfully address present and future market needs by offering more sophisticated and environmentally friendly services by integrating Kardan's knowledge and resources.

The Chinese cement sector is currently experiencing a slowdown in domestic demand, resulting in industry overcapacity, falling profit margins and an overall recession. In addition, increasingly stringent and restrictive regulations introduced by the Chinese government to reduce carbon emissions have put a strain on cement producers, limiting production and worsening the industry's problems. To sustain continued growth, the organization must find new revenue streams and encourage economic growth. In this case, the purchase of Kardan Water is strategically significant since it enables Gezhouba Group to broaden its purview and enter in new markets of green industry.

From a social perspective, there are now greater expectations for environmental quality and living circumstances in China due to the country's rapid economic development and rising living standards. Companies are under pressure to live up to the increasing expectations of the public for a cleaner and more sustainable environment.

High technical requirements are needed by the environmental protection sector to guarantee efficient and clean industrial processes. Achieving these objectives requires the use of new green technology, and businesses that want to stay competitive must spend money on innovative ways to lessen the environmental

effect of their operations.
With the purchase of Kardan Water, Gezhouba Group, which is already involved in the hydraulic engineering industry, will have the chance to solidify its position in the water industry. Through this deal, the company will be better equipped to handle problems related to water management and show that it truly values social responsibility, which will improve both its reputation and the public's opinion of its community service.
Acquiring Kardan Waters' cutting-edge technologies, Gezhouba will be able to better achieve its commitment to sustainability and meet technical environmental protection criteria while also increasing operating efficiency.
With its project management experience, Gezhouba Group achieved rapid integration of Kardan Water after GMA.
The company can take use of important resources including the Hong Kong group's well-established reputation, reliable funding sources, and cross-functional knowledge by purchasing it. Simultaneously, Kardan's specific knowledge expands the Group's working scope and enhances its offering.
The acquisition allows the Chinese giant to extend its entire industry chain and incorporate the concept of big environmental protection into its over layout (Zhang et al., 2023).
After the agreement with the Hong Kong corporation, Gezhouba moved quickly to put in place a framework for resource acquisition, integration, and usage. In terms of acquisitions, it has first acquired green technology, highly skilled technical staff, equipment for environmental protection, a customer base, and management expertise in the water treatment sector. Kardan Water boasts a team of professionals with extensive expertise handling water projects and a variety of state-of-the-art water treatment technology. Gezhouba Group has expanded its talent pool in the water treatment sector quickly as a result of the purchase. Furthermore, the parent business of Kardan Water manages water treatment projects in over 50 nations and regions, providing Gezhouba Group with fresh prospects in the global water market.

In the second step, Gezhouba Group has dedicated a significant amount of time and effort to the integration of resources. This includes harmonizing resources, upgrading its vision for sustainable development, bolstering research and development of green resources, enhancing the management and operation of green production, and integrating the water industry chain. The company's ability to improve its operations in terms of sustainability and to grow and solidify its market position has been made possible by this strategic approach (Zhang et al.,2023).

In addition of the acquisition of Kardan Water, Gezhouba Group has paid special attention to environmental challenges and technological innovation in the water sector. Partnerships with top green technology firms like Israel's Ramim, Aqwise, AST, RWL and others leader companies on water and infrastructure green technology are evidence of this dedication.

Gezhouba has been able to include drip irrigation, sludge management, modernizing the water system, and treating highly concentrated industrial wastewater thanks to these partnerships. Innovative pilot projects for the filtration of chemically contaminated water and the repurposing of wastewater in agriculture have resulted from some of these collaborations.

Even with positive outcomes, certain studies still need to be modified in order to make the technologies widely usable.

From the point of view of GMA's results, according to a 2023 study by Zhang et al. that was published in Science Direct, Gezhouba Group's overall performance has significantly improved since the acquisition of Kardan Water. The three main areas of performance that show this improvement are the market, financial, and environmental.

The acquisition of Kardan Water was welcomed by investors. The overall trend was positive after the merger announcement, despite some fluctuations in the first days in stock returns. The market performance of the Chinese company improved compared to before the GMAs, confirming that such initiatives can help improve the competitiveness and value of the company.

According to this information, the stock market's response to Gezhouba Group's green M&A has been mainly positive.
As for financial performance, it also benefited from the acquisition of Kardan Water, in fact, as "The analysis of operating revenues for the years 2015 and 2016 of the water division, had a significant impact on the acquisition of Kadran Water. In 2016, the operating revenues of the water division reached 276 million yuan (about 36.5 million euros), showing a growth rate of 124%" (Zhang et al., 2023). The financial strength of Gezhouba Group has been reinforced in the water industry. Its enhanced market position shows how effective its acquisition strategy was in fostering both economic growth and sustainable development.
Regarding environmental performance, the Gezhouba Group allocated 246.3 million yuan (about 32.4 million euros) in 2015 to environmental protection projects; by 2016, that amount had grown to 2.048 billion yuan, a tenfold increase. In terms of environmental penalties or infractions, the company's pollutant emissions from 2014 to 2016 continuously met the discharge criteria. Furthermore, when comparing the annual operational revenue to the amount of pollutants used, the overall emissions consistently displayed a declining trend. The aforementioned analysis, which was carried out by Zhang et al. in 2023 and published in Science Direct, demonstrates how important cleaner production is to Gezhouba Group now that the company has started down the path of environmental conservation through green mergers and acquisitions. This study demonstrates that although the number of environmental protection projects has increased, pollution consumption has not. The case study in question has highlighted how GMAs not only bring an advantage from an environmental and sustainable point of view, but also turn out to be strategic, as in this case, bringing competitive advantages, thanks to the diversification of one's business for example.

Conclusion

Green Mergers and Acquisitions (GMAs) are a crucial turning point for today's corporate strategies. They enable companies to address global sustainability challenges, turning them into opportunities for growth and innovation.

This thesis aimed to demonstrate how such operations not only respond to climate needs in terms of emissions reduction and regulatory compliance but also act as tools to improve competitiveness, corporate reputation, and access to new sustainable technologies and markets. Compared to internal environmental investments, which generally require a long time and have uncertain outcomes, GMAs have the advantage of allowing companies to access clean technologies and specialized personnel more quickly. In this context, the number of GMA operations is constantly increasing, also thanks to governments encouraging the most polluting companies to undertake such operations to achieve green transformations.

However, as demonstrated throughout the thesis, GMAs are not free from complexity. Indeed, the integration of acquired or incorporated resources, risk management, and the need to avoid opportunistic behaviors, such as greenwashing, represent significant challenges that require a strategic approach and a careful vision in the medium to long term.

The Chinese case is an emblematic example of the various positive aspects and effectiveness obtained by GMAs. It turns out to be an interesting case study due to the high environmental impact of some industries and the rapid industrialization that characterizes it. It is no coincidence that China is among the largest emitters of CO2 globally, contributing to almost 30% of global emissions. This data highlights the enormous scope of the environmental challenges that China will face

and demonstrates how these extraordinary operations can contribute to overcoming these critical issues.

In this context, the Chinese government is adopting an ambitious plan to address and overcome the climate crisis, setting clear goals for what concerns peaking emissions by 2030 and carbon neutrality by 2060.

The case study in the third chapter demonstrates how these types of mergers and acquisitions can be a strategic tool to exploit government incentives and respond to the increasingly stringent regulatory pressures imposed by the authorities. The Chinese government introduced and continues to promote a series of incentives and subsidies aimed at companies that decide to invest in green technologies and that aim to minimize their environmental impact. This policy has successfully created a favorable environment for mergers and acquisitions focused on sustainability.

However, Green M&A is not limited to emerging contexts such as China; it also represents a phenomenon of global relevance. Another concrete example is the initiatives promoted by the European Union, such as the Green Deal and the Paris Agreement, which aim to drastically reduce emissions and incentivize sustainable technologies through dedicated policies and targeted financing.

In conclusion, this thesis aims to demonstrate how these strategies are more than a simple response to environmental challenges: they represent a new strategic frontier for companies, which will have to adapt increasingly to a global context-oriented towards sustainability. The Chinese case, with its characteristics and results, particularly in the highly polluting sectors, demonstrates how these strategies can contribute to reducing emissions and creating value.

The future of Green M&A will, therefore, depend on the ability of companies, governments, consumers, and investors to collaborate in order to build an economic system in which the issue of sustainability is no longer an optional choice but a strictly intrinsic component of corporate strategies. It is, therefore, essential to continue to monitor and evaluate the impact of GMAs, promoting transparency, innovation, and integration between companies and institutions,

avoiding opportunistic behavior. Only in this way will it be possible to fully exploit the enormous potential of these strategies and contribute to a more sustainable future.

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