UNIVERSITÀ POLITECNICA DELLE MARCHE
FACOLTÀ DI ECONOMIA "GIORGIO FUÀ"

Corso di Laurea Magistrale in International Economics and Commerce

Curriculum: Business Organization and Strategy

THE ANALYSIS OF A BUSINESS MODEL:

THE CASE OF ENEL X

Relatore: Chiar.mo
Prof. Nicola Matteucci

Tesi di Laurea di:
Marco De Luca

Anno Accademico 2018 – 2019

TABLE OF CONTENTS

ABSTRACT

La mobilità elettrica è destinata a essere il nuovo paradigma industriale del ventunesimo secolo, ed è la naturale conseguenza di uno scenario internazionale che sta facendo della transizione ad un'economia sostenibile e della lotta al cambiamento climatico i suoi punti cardine. In questo contesto si inserisce Enel X, un'azienda italiana che opera nel campo della mobilità elettrica con l'obiettivo di promuoverne la diffusione ed offrire un servizio di ricarica pubblicamente accessibile ai possessori di veicoli elettrici.

L'obiettivo di questa tesi è quindi quello di analizzare il business model per la mobilità elettrica utilizzato dall'azienda. In particolare, lo scopo della ricerca è di determinare il funzionamento di tale business model e prevederne, per quanto possibile, la sostenibilità e competitività nel lungo periodo. A tal fine, l'analisi è basata sulla più rilevante letteratura economica attualmente disponibile sul concetto di business model così come su documenti aziendali, report del settore e l'attuale quadro normativo di riferimento.

Dallo studio effettuato è emerso che Enel X utilizza un cosiddetto "business model integrato" attraverso il quale controlla tutte le attività della catena del valore riguardante il servizio di ricarica. Inoltre, considerata la correlazione esistente tra il servizio di ricarica e la mobilità elettrica, è emerso che lo sviluppo tecnologico dell'industria e un quadro normativo favorevole, sia a livello europeo che italiano, rappresentano elementi che, verosimilmente, favoriranno la sostenibilità e competitività del business model nel lungo periodo.

INTRODUCTION

The aim of this thesis is to carry out the analysis of the business model of an Italian company: Enel X. Specifically, the objective of the analysis is to investigate the business model for electric mobility employed by the firm in Italy. In order to accomplish this research purpose, the thesis is structured in three chapters.

The first chapter introduces the circular economy, as the latter is an inspiration for Enel X's electric mobility business model. In particular, it describes the development of the circular economy concept, presents an overview of the definitions proposed by scholars over time, identifies the principles on which circular economy is based, delineates the distinction between circular economy and related concepts (i.e., from cradle-to-cradle to industrial ecology), and concludes with some considerations on the effective future implementation of the circular economy.

The second chapter gives a description of the economic literature on business model. In detail, it traces the origins, development and diffusion of the business model concept, provides an overview of the definitions that have characterized the business model over the years, and clarifies the differences between business model and other management terms (i.e., business concept, business process modelling, revenue model and economic model) as they are often erroneously used as synonyms. Furthermore, it sheds light on the elements to consider in business model

design and explicates the interrelations between business model, technological innovation, dynamic capabilities and strategy.

The third and last chapter reports the business model analysis of Enel X. The analysis is aimed at describing the functioning of the company's business model and forecasting its sustainability and viability in the long term; and is based on some of the theoretical concepts discussed in chapter two as well as information from corporate documents, various industry reports and current regulatory framework. After a concise presentation of the company, the first step of the analysis is to delineate its strategy, dynamic capabilities and business model by highlighting their existing interrelations. Afterwards, the analysis is focused on determining the influence that the electric mobility industry may have on the company's business model, since the latter are strongly correlated. More precisely, the discussion concerns the role that technological evolution and regulation of the electric mobility industry may play in the competitiveness of the business model in the long run.

CHAPTER I - THE CIRCULAR ECONOMY

I.1. INTRODUCTION

The linear economy is the traditional economic model that has its origin in the industrial revolution of the 18th century. It is based on a take-make-consume-throw away sequence, which ignores the limits of the environment and is causing the depletion of the planet's resources (Prieto-Sandoval et al., 2018).

To reduce environmental damage and ensure a sustainable future for society, the linear economy is gradually being replaced by an alternative concept: the circular economy.

The prominence of the circular economy can be attributed to the perceived urgency for better resource efficiency (Geisendorf et al., 2017).

Boulding (1966) was the first scholar that suggested a concept for circular material flows. In his book, "the economics of the coming spaceship Earth", he asserts that circular systems within the global economy are inevitable to guarantee human life on Earth in the long run.

Pearce et al. (1989) agreed with the recommendation of Boulding that the traditional linear economy concept without recycling elements is no longer sustainable and, hence, must be substituted by a circular system.

Other influences of the circular economy concept can be found in the research on general systems theory (Von Bertalanffy, 1968), industrial economy (Preston, 2012), and industrial ecology (Prieto-Sandoval et al., 2018).

According to Andersen (2007), Germany was the first nation in Europe to establish policies for the implementation of the circular economy. In particular, in 1972, Germany instituted a waste disposal act (BGBI I S.873) and further developed the concept of extended producer responsibility[1].

Currently, the circular economy is one of the most discussed environmental economic concepts. Indeed, in recent years, the term circular economy gained increasing attention among both scholars and practitioners. As a result, academic articles and practical proposals increased significantly.

Furthermore, the circular economy is a focus of the European Union Horizon 2020 strategy[2].

In the following paragraphs we will investigate the circular economy concept, by analysing its development, presenting an overview of definitions, listing its principles and explaining its related concepts, to conclude with a reflection on the actual possibilities of an effective implementation of the circular economy.

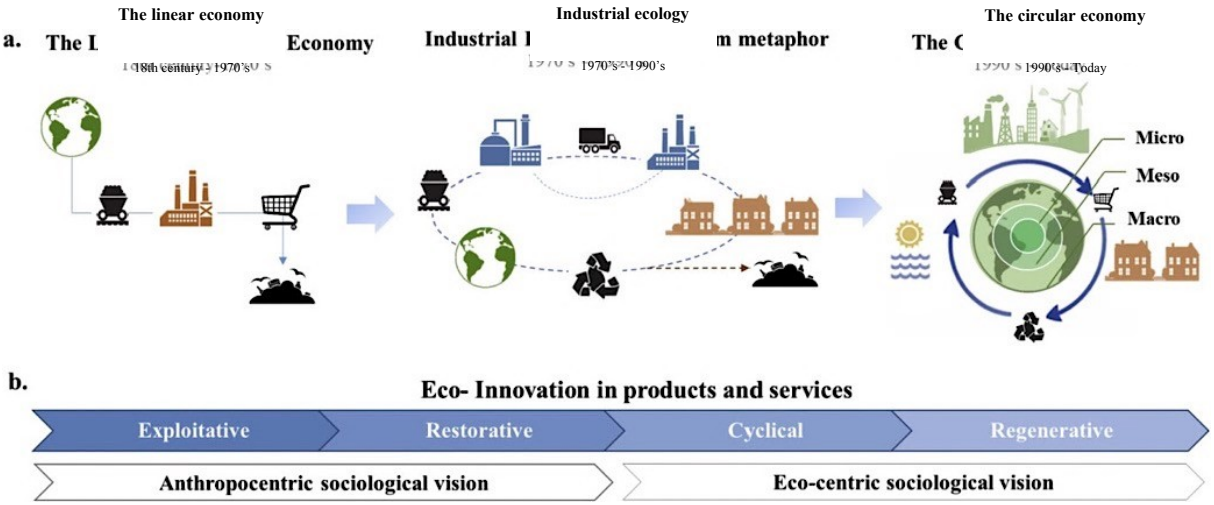
[1] Extended Producer Responsibility (EPR) is a policy approach under which producers are given a significant responsibility-financial and/or physical-for the treatment or disposal of post-consumer products (Extended producer responsibility-OECD).
[2] The Europe 2020 strategy is the EU's agenda for growth and jobs for the current decade. It emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in Europe's economy, improve its competitiveness and productivity and underpin a sustainable social market economy (Europe 2020 strategy).

I.2. THE DEVELOPMENT OF THE CIRCULAR ECONOMY CONCEPT

The concept of circular economy has developed from a multidisciplinary perspective (i.e., from economics to engineering) (Prieto-Sandoval et al., 2018).

According to Prieto-Sandoval et al. (2018), the development of the circular economy can be divided into three main phases, as depicted in Figure I.1:

Figure I.1 The development of the circular economy



above, the linear economy is based on a take-make-consume-throw away sequence without recycling elements. It began with the industrial revolution in the 18th century and was interrupted in the sixties by the remarkable interest in the environment, particularly by scientific publications such as Carson (1962) and Boulding (1966);

- Industrial ecology[3]: the second phase is characterized by the concepts of industrial ecology and green economy. It lasted from the 1970s to the 1990s. Ayres et al. (1969) and Ayres (1989) developed the first theoretical and practical initiatives of industrial ecology. According to these authors, industrial activities can work like a metabolism where the different actors (i.e., companies, consumers etc.) are integrated through their resources and wastes, which continuosly circulate in the system. Over the same period, it emerged a growing interest in green economy. A green economy is an economy that «results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities» (UNEP, 2011, p.2). The green economy has played a key role in the environmental strategies of governments and institutions;
- Circular economy: the third and final phase started at the beginning of the 1990s and is still ongoing. It is characterized by the emergence and prominence of the concept of circular economy.

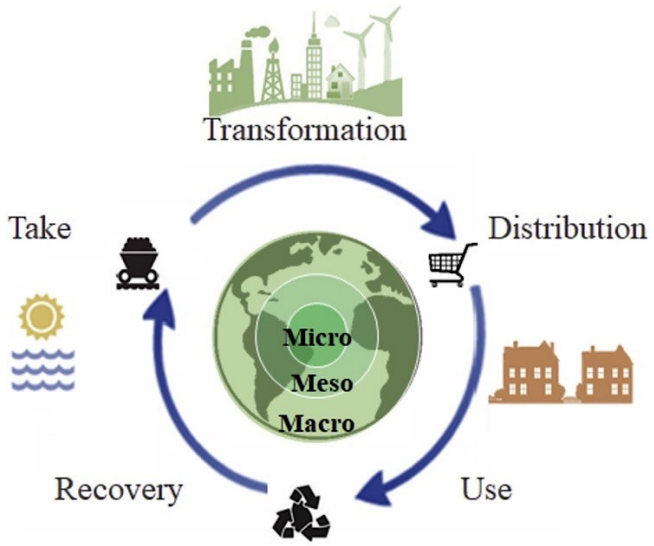
The term circular economy was coined by Pearce et al. (1989) following the research of Boulding (1966).

[3] See also subparagraph 1.5.9

The circular economy is outlined as a cycle of the exploitation, transformation, distribution and use of resources, and the subsequent recovery of products and materials (Stahel, 2016; Park et al., 2010).

Figure I.2 illustrates the circular economy cycle.

Figure I.2 Circular economy cycle



Source: Prieto-Sandoval et al. (2018)

As illustrated in Figure I.2, the circular economy cycle begins with companies extracting resources from the environment, and then transforming them into products. Next, companies distribute the products for use by consumers or other companies. At this point, companies close the loop through the recovery and recycling of the products. Finally, the recycled products are reused in the economic system.

Furthermore, the circular economy is characterized by three different levels of research and implementation (Yuan et al., 2006):

- Micro-level: at the micro, or enterprise, level companies focus on the improvement (from an environmental point of view) of their business processes (e.g., production and distribution processes). At this level, the implementation of circular economy has a positive impact on companies' reputation among consumers (Ormazabal et al., 2016);
- Meso-level: the meso level includes companies that belong to industrial agglomerations (i.e., the concentration of industrial activities in a specific area) that benefit both the regional economy and the environment (Geng et al., 2012);
- Macro-level: the macro level focuses on the development of eco-cities [4], eco-municipalities or eco-provinces through the establishment of environmental policies (Yuan et al., 2006).

I.3. THE CIRCULAR ECONOMY: AN OVERVIEW OF DEFINITIONS

The literature presents different definitions of circular economy given by scholars over time. However, a complete review of all existing definitions of circular economy exceeds the aim of this thesis.

[4] An eco-city is «a human settlement modelled on the self-sustaining resilient structure and function of natural ecosystems. The ecocity provides healthy abundance to its inhabitants without consuming more (renewable) resources than it produces, without producing more waste than it can assimilate, and without being toxic to itself or neighbouring ecosystems» (Ecocity Builders).

To define the circular economy concept we will refer to the work of Prieto-Sandoval et al. (2018), which carried out a review of the most recent definitions of circular economy in order to provide a coherent definition.

Table I.1 displays definitions of circular economy provided by scholars over time, ordered from the least recent to the most recent.

Table I.1 Definitions of circular economy

Author	Year	Page	Definition of circular economy
Peters et al.	2007	p.5943	The central idea is to close material loops, reduce inputs, and reuse or recycle products and waste to achieve a higher quality of life through increased resource efficiency.
Geng et al.	2008	p.232	Mean the realization of a closed loop of materials flow in the whole economic system. (...) implying a closed-loop of materials, energy and waste flows.
Yang et al.	2008	p.814	Circular economy is an abbreviation of "Closed Materials Cycle Economy or Resources Circulated Economy". (...) The fundamental goal of circular economy is to avoid and reduce wastes from sources of an economic process, so reusing and recycling are based on reducing.
Xue et al.	2010	p.1296	Circular economy is the outcome of over a decade's efforts to practice sustainable development by the international communities, and is the detailed approach towards sustainable development (Moriguchi, 2007).
Park et al.	2010	p.1496	The CE policy seeks to integrate economic growth with environmental sustainability, with one element relying on new practices and technological developments, similar to the application of environmental modernization technology.
Ma et al.	2014	p.506	A circular economy is a mode of economic development that aims to protect the environment and prevent pollution, thereby facilitating sustainable economic development.
Haas et al.	2015	p.765	The circular economy (CE) is a simple, but convincing, strategy, which aims at reducing both input of virgin materials and output of wastes by closing economic and ecological loops of resource flows. In a CE, material flows are either made up of biological nutrients designed to re-enter the biosphere, or materials designed to circulate within the economy (reuse and recycling) (GEO5 2012).

Author	Year	Page	Definition of circular economy
Gregson et al.	2015	p.9	The circular economy seeks to stretch the economic life of goods and materials by retrieving them from post-production consumer phases. This approach too valorises closing loops, but does so by imagining object ends in their design and by seeing ends as beginnings for new objects.
Stahel	2016	p.435	A 'circular economy' would turn goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimizing waste. It would change economic logic because it replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired.
Ghisellini et al.	2016	p.16	Circular economy is defined by Charonis (2012), in line with the Ellen Macarthur Foundation vision (2012), as a system that is designed to be restorative and regenerative.
Geissdoerfer et al.	2017	p.766	A regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. Second, we define sustainability as the balanced integration of economic performance, social inclusiveness, and environmental resilience, to the benefit of current and future generations.
Kirchherr et al.	2017	p.224	A circular economy describes an economic system that is based on business models which replace the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/distribution and consumption processes, thus operating at the micro level (products, companies, consumers), meso level (eco-industrial parks) and macro level (city, region, nation and beyond), with the aim to accomplish sustainable development, which implies creating environmental quality, economic prosperity and social equity, to the benefit of current and future generations.

Source: Prieto-Sandoval et al. (2018)

Table I.1 highlights the authors' different perspectives in defining the circular economy. In particular, the authors focus on the following aspects of a circular economy:

- Regenerative system: the circular economy is defined as a regenerative system in which «resource input and waste, emission, and energy leakage are

minimised by slowing, closing, and narrowing material and energy loops» (Geissdoerfer et al., 2017, p.766);

- Strategic value: the strategic value of a circular economy consists in «closing economic and ecological loops of resource flows» (Haas et al., 2015, p.765);
- Multi-level vision: the most recent definitions of circular economy include the micro, meso, and macro levels of the concept (Kirchherr et al.,2017);
- Sustainable business models: the implementation of a circular economy is based on new and sustainable business models (Kirchherr et al., 2017);
- Policy and model: the circular economy is seen as a policy and model aimed at promoting sustainable and nature-friendly economic growth (Ma et al., 2014; and Park et al., 2010);
- Sustainable development: despite their differences, most authors agree that the circular economy is part of the solution for achieving sustainable development (Kirchherr et al., 2017; Geissdoerfer et al., 2017; Ma et al., 2014; and Xue et al., 2010).

In conclusion, based on these contributions, Prieto-Sandoval et al. (2018) assert that the concept of circular economy is made up of four components:

- the minimization of resources demand, the recirculation of resources and energy, and the recovery of value waste;
- a multi-level approach (i.e., micro, meso, and macro levels);

- the importance of circular economy in achieving sustainable development;
- the relationship between circular economy and the way society innovates (i.e., the way industries produce, consumers use, and policy makers legislate).

Fundamentally, the circular economy is opposite to the linear economy concept. The latter is based on a take-make-consume-throw away sequence without recycling elements, while the first has its core defining element in the restorative use of resources.

I.4. THE 3RS PRINCIPLES OF THE CIRCULAR ECONOMY

According to Geisendorf et al. (2017), the core approach of the circular economy is summarized by the 3Rs principles:

- Reduction

The first R principle, reduction, represents the attempt to achieve eco-efficiency in production and consumption. Eco-efficiency is both a business framework and a objective for companies, aimed at «creating value while decreasing environmental impact» (Huppes et al., 2005, p.43). The social dimension is not mentioned explicitly within the goal of eco-efficiency, but resource efficiency[5] preserves resources for the use of future generations and, consequently, indirectly increases

[5] Resource efficiency means using the Earth's limited resources in a sustainable manner while minimising impacts on the environment. It allows to create more with less and to deliver greater value with less input (European Commission).

social well-being (Ness, 2008). Hence, the reduction principle focuses on the importance for the circular economy of economic, environmental, and social improvements;

- Reuse

The second R principle, reuse, involves a more appropriate design of business models and products for a cyclical disassembly and reuse sequence (Ghisellini et al., 2016). The activities related to this principle, such as remanufacturing[6] or repairing, should be carried out regionally to reduce packaging and transportation (Stahel, 2013). However, this principle can be implemented successfully only if consumers are willing to buy remanufactured and reusable products. This requires an effort of public insitutions in educating people, and a shared responsibility between producers and consumers to collect products after the first cycle of use (Lenzen et al., 2007);

- Recycle

The third R principle, recycle, as stated by the European Union (2008, p.8), refers to «any recovery operation by which waste materials are reprocessed into products, materials or substances, whether for the original or other purposes. It includes the

[6] Remanufacturing is the «rebuilding of a product to specifications of the original manufactured product using a combination of reused, remanufactured and new parts» (Johnson et al., 2014, p.14).

reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations».

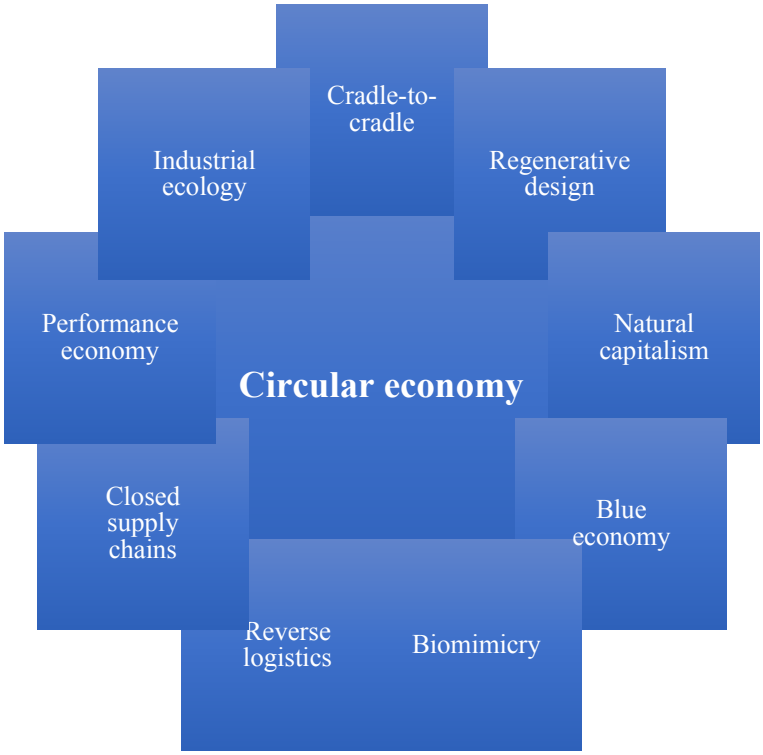
In summary, the circular economy, through its principles, encourages all economic agents to contribute to a more environmentally friendly use of resources (Planing, 2015).

I.5. THE CONCEPTS RELATED TO CIRCULAR ECONOMY

Ghisellini et al. (2016) claim that there is no consensus on what a circular economy involves. Due to the profusion of related concepts some scholars even affirm that the circular economy stands on "shaky ground" (De Man et al., 2016). In fact, according to Geisendorf et al. (2017), in addition to the circular economy there are other concepts that propose circular solutions for economic activities, such as cradle-to-cradle, regenerative design, natural capitalism, blue economy, biomimicry, reverse logistics, closed supply chains, performance economy, and industrial ecology.

Figure I.3 illustrates the interconnections between the circular economy and related concepts.

Figure I.3 Circular economy and related concepts



Source: our elaboration based on Geisendorf et al. (2017)

As can be seen from Figure I.3, the concepts related to circular economy are highly interconnected. For this reason, many researchers and practitioners use circular economy and related concepts as interchangeable terms. Actually, each concept has unique characteristics and goals. Thus, they are not synonyms.

The following sections analyse each concept separately and highlights their main principles and differentiating characteristics.

I.5.1. Cradle-to-cradle

Initially, the term cradle-to cradle was first introduced by Stahel et al. (1981). Later on, the concept was further developed in the book of McDonough et al. (2002).

Cradle-to-cradle is a «holistic framework that aims at creating efficient, sustainable, and waste-free systems» (Geisendorf et al., 2017, p.774). Specifically, the aim of cradle-to-cradle is to minimize the environmental damage of products through more sustainable production processes, distribution, disposal practices, and socially responsible products (Visser, 2010).

The definition of cradle-to-cradle of Geisendorf et al. (2017) encompasses the concepts of:

- Efficiency

Baumgartner et al. (2007) specify that the term cradle-to-cradle also focuses on the design stage of products. In fact, product components must be designed for circular recovery or reutilization so that products with increased efficiency have minimum negative effects on the environment. According to McDonough et al. (2003), it also suggests the use of renewable material and energy;

- Sustainability

De Pauw et al. (2013) assert that the term cradle-to-cradle also concerns a closed-loop supply chain [7] where a recycling process begins with the end of life of the products. The recycled materials can then be used for both the same purpose or to produce different products (Huang et al., 2007);

- Waste treatment

Lovins (2008) affirms that the term cradle-to-cradle also includes the treatment of waste. In particular, waste should be completely eliminated or, if not possible, it should be a value-producing resource. To achieve this goal, cradle-to-cradle requires the implementation of collection and recovery procedures within the supply chains of a company (Kumar et al., 2008).

Cradle-to-cradle can be applied both at the micro level of a company, involving manufacturing and design processes, and at the macro level of an economy as a whole, involving infrastucture design and urban environments.

In conclusion, the cradle-to-cradle concept shares the most similarities with that of circular economy. For this reason, the two terms are often used as synonyms (Esposito et al., 2017a).

[7] See also subparagraph 1.5.7

I.5.2. Regenerative design

The work on regenerative agriculture of Rodale (1983) was a milestone in the research field of regenerative design utilizable also in other sectors of the economy.

The concept of regenerative design was further developed by Lyle (1996), an architect whose aim was creating a framework for a community that can function with the locally available renewable resources without destroying them (Geisendorf et al., 2017).

Indeed, according to Geisendorf et al. (2017, p.774), in the regenerative design concept «all materials or waste should be reintroduced into the system or metamorphosed into new valuable resources at the end of the product's life». Accordingly, the word "regenerative" means that the materials and energy used for the design of products can be regenerated and renewed (Cole, 2012). Thus, the aim of regenerative design is to help companies during the design stage of products and services and become completely waste free.

Frequently, regenerative design is realized by means of biomimicry [8] (Lieder et al., 2016).

[8] See also subparagraph 1.5.5

Despite the importance of regenerative design, cradle-to-cradle outclassed regenerative design in terms of research since it covers more aspects of circularity and, therefore, attracts the interest of more researchers.

I.5.3. Natural capitalism

Natural capital refers to the Earth's natural resources such as air, water, soil, and all living organisms (Costanza et al., 1992).

As stated by Hawken et al. (2013), natural capitalism is based on the following four principles:

- Radical resource productivity: the productivity of natural capital should be increased, through the redesign of products and the operation of new technologies in production processes, for the purpose of extending the utilizable life of natural resources. In this way, companies will save costs and have the opportunity to invest in new technologies;
- Biomimicry: production models inspired by nature's design should be implemented to reduce or eliminate waste through closed-loop production systems;
- Service and flow economy: in a service and flow economy, a service-oriented model should substitute the traditional sale-of-goods model. For example, an air conditioners manufacturer can loan its physical equipment to customers and

get paid for the maintenance (i.e., the service) instead of the product itself. This solution provides value to customers and, at the same time, increases resource productivity;

- Investing in natural capital: the cost savings derived from the previous three principles enable companies to reinvest these additional resources in natural capital. This will lead in turn to a higher regeneration of natural resources.

Thus, in the model of Hawken et al. (2013) companies and the environment share many common interests.

I.5.4. Blue economy

The concept of blue economy was developed by Pauli (2010). The blue economy «aims at protecting the global ecosystem while creating new job opportunities. It thus pursues a holistic approach, also addressing societal issues» (Geisendorf et al., 2017, p.774). In detail, the blue economy proposes that the local environment, with its specific ecological features, is the basis for sustainable solutions.

According to the Ellen MacArthur Foundation (2016), the blue economy is a main source of inspiration for the circular economy.

I.5.5. Biomimicry

Biomimicry consists in the development of environmentally sustainable innovations inspired or imitated by the design of nature (Reap et al., 2005).

Therefore, the goal of biomimicry is to create products and processes that function like the natural components of the ecosystem, that is, without negative effects on the environment (Benyus, 1997). To achieve this goal, biomimicry aims at a better understanding of the mechanisms of the natural system so that they can be copied.

Biomimicry is in part related to the concept of closed supply chains. In fact, closed supply chains basically aim at avoiding the production of waste, which is a feature of nature.

The connection between biomimicry and closed supply chains brings the concept of biomimicry close to that of circular economy, although compared to the latter it has a far narrower focus.

I.5.6. Reverse logistics

Reverse logistics, as stated by the European working group on reverse logistics (REVLOG), is «the process of planning, implementing and controlling backward flows of raw materials, in-process inventory, packaging and finished goods from a

manufacturing distribution or use point to a point of recovery or point of proper disposal» (De Brito et al., 2004, p.5).

The concept of reverse logistics encompasses many aspects. It concerns mainly the reuse of materials and products (Fleischmann et al., 1997), but it also includes remanufacturing (Kim et al., 2006), refurbishing (Ravi et al., 2005), the collection of products after the useful life (Daugherty et al., 2002), and the management and sale of returned products (i.e., return of products due to damage) (Geisendorf et al., 2017). For companies, the latter aspect is of great importance in terms of the profitability of reverse logistics since it is related to customer retention (i.e., keep a stable customer base) (Daugherty et al., 2002).

In short, with respect to traditional logistics (i.e., products transferred from the company to customers), reverse logistics allows products to move backward, from customers to the company, through the supply chain (Rogers et al., 2001). Finally, reverse logistics is a necessary business process for a closed supply chain.

I.5.7. Closed supply chains

Closed supply chain, or closed-loop supply chain, is both a forward and reverse supply chain where a mix of reuse options is employed by the producer depending on the most profitable alternative (Krikke et al., 2004).

In the definition of Krikke et al. (2004), the concept of closed supply chain encompasses forward supply chain, reverse supply chain, reuse options, and profitability.

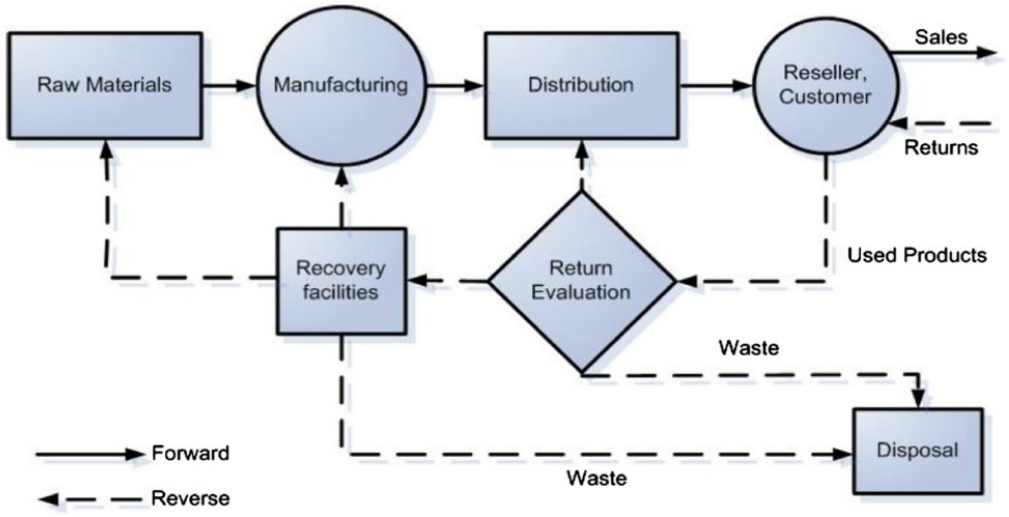
A forward supply chain (i.e., the classical form of a supply chain) is a combination of processes to fulfill the requests of customers, and includes all possible entities such as suppliers, manufacturers, transporters, warehouses, retailers, and customers themselves (Chopra et al., 2010).

A reverse supply chain is the process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished products and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal (Rogers et al., 1998).

Thus, a closed supply chain is the result of the combination of both a forward and reverse supply chain (Govindan et al., 2015).

Figure I.4 displays a generic closed supply chain. The solid lines and dashes represent the forward and reverse supply chains, respectively.

Figure I.4 Generic closed supply chain



Source: Govindan et al. (2015)

With respect to the recovery options, Krikke et al. (2004) present six options that a company can employ:

- Direct reuse: the returned products are checked on damage and cleaned;
- Repair: some components of the returned products are repaired or replaced, and then the products are restored to working order;
- Refurbishment: modules of the returned products are repaired or replaced by upgrades;
- Remanufacturing: a part of the old returned products' components are used to manufacture new products;
- Cannibalization: some components of the returned products are selectively retrieved;

- Scrap: the returned products are shredded, sorted, recycled and disposed.

The choice of the recovery option depends on its profitability. In fact, the returned products are processed through the most profitable alternative. Accordingly, the definition of closed supply chain of Krikke et al. (2004) has an explicit profit orientation.

According to Krikke et al. (2004), there are five key business processes involved in a closed supply chain:

- Product acquisition: it is about retrieving the products from the market, through buy-back as well as other physical collection methods;
- Reverse logistics: it involves the transport of the returned products to the location of recovery;
- Sorting and disposition: it concerns the sorting and classification of the returned products based on their quality and composition. A company can then choose among the six recovery options mentioned above;
- Recovery: it is the process of retrieving, reconditioning, and regaining products, components and materials;
- Redistribution and sales: is the process of distribution and sales of the secondary products through a classic forward supply chain.

The sequence and importance of these business processes may vary from company to company.

In practice, the management of a closed supply chain consists in «the design, control, and operation of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time» (Govindan et al., 2015, p.603).

In conclusion, closed supply chains suggest a strategy for the «end-of-life product management that creates economic and environmental value» (Geyer et al., 2004, p.56). Therefore, the success of the implementation of a closed supply chain is measured based on its economic and environmental benefits (Ayres et al., 1997).

I.5.8. Performance economy

The concept of performance economy was developed by Stahel (1994).

According to the author, performance economy represents a utilization-focused service economy based on resource efficiency and product-life extension. A product-service economy is «a system of products, services, supporting networks, and infrastructure that is designed to be: competitive, satisfy customer needs and have a lower environmental impact than traditional business models» (Mont, 2002, p.239). In other words, a product-service economy underlines the environmental benefits of selling services rather than products.

An important aspect of the performance economy is circularity. In fact, the goal of performance economy is to improve sustainability through a more dematerialized system, that is, a system in which the use value of products is maximized and, as a result, the materials and energy used for a service are minimized (Geisendorf et al., 2017). In detail, the performance economy has three primary goals: reduce resource consumption, create new jobs, and increase wealth (Product Life, 2016).

For the performance economy to work, it is necessary that companies change their organizational structures and processes, and that customers are willing to accept the use of a service rather than the ownership of a product (Mont, 2002).

I.5.9. Industrial ecology

The concept of industrial ecology has its roots in the article of Frosch et al. (1989).

The authors argue that the traditional linear model of industrial activity (i.e., consume raw materials, generate products, and dispose waste) should be transformed into an industrial ecosystem, which is a more integrated and environmentally sustainable model for industrial activity.

Industrial ecology examines the interaction between technology and industrial activities, as well as social and environmental consequences (Erkman, 1997). The examination consists in the analysis of the usage and flow of materials and energy

during the product life cycle, in order to reduce environmental damage. Thus, in industrial ecology the environmental aspects are more important than profitability (Geyer et al., 2004). Theoretically, in an industrial ecosystem the use of energy and materials is optimized, waste production and pollution are minimized, and by-products (e.g., plastic containers of consumer products) are recycled and utilized as raw materials for another manufacturing process.

Industrial ecology consists of three dimensions (Erkman, 1997):

- Analytical: industrial ecology is analytical because tries to explain the functioning of the industrial system;
- Methodological: industrial ecology is methodological because aims at including regulation between the industrial system and «its interaction with the biosphere» (Erkman, 1997, p.2);
- Proactive: industrial ecology is proactive in the sense that it suggests ideas to governments and companies on how to contribute to a more sustainable economy (Berkel et al., 1997).

In summary, an industrial economy examines industrial processes from a biological ecosystem perspective, with the aim at restructuring industrial processes to make them compatible with the natural ecosystem (Allenby, 2000).

I.6. CONCLUSIONS

Despite the increasing significance and diffusion of the circular economy, its implementation certainly faces many obstacles.

One of them is that, in general, companies' profits are mostly driven by the sale of products with linear life cycles (Feldman et al., 2007). This means that companies have no incentive to extend their products lifetime and that, therefore, the design for obsolescence is a logical consequence (Linton et al., 2005).

For this reason, new business models are needed for the effective implementation of the circular economy. Indeed, for most scholars the circular economy has the potential for disruptive business models aimed at sustainable economy and healthy society (Esposito et al., 2017a).

Public authorities may speed up the implementation process of the circular economy, with legislation that can act as an incentive for individuals and companies, as in the case of the German "closed substance cycle waste management act[9]".

Anyway, the scientific community is divided on whether the concept of circular economy can coexist with economic growth. On the one hand, McKinsey & Company (2015) claim that the implementation of a circular economy will lead the

[9] In short, the purpose of the "closed substance cycle waste management act" is to promote closed substance cycle waste management in order to conserve natural resources and to ensure environmentally compatible disposal of waste.

economy to grow by €1.8 trillion until 2030. However, on the other hand, some scholars assert that the implementation of a circular economy is possible only if the current goal of economic growth is not considered (George et al., 2015).

In conclusion, thus, there is no clear consensus on the outcomes, whether positive or negative, of the implementation of the circular economy.

CHAPTER II - THE BUSINESS MODEL: A LITERATURE OVERVIEW

II.1. THE BUSINESS MODEL CONCEPT: ORIGINS, DEVELOPMENT AND DIFFUSION

The term business model has been present in the economic literature for over sixty years now, being utilized by both academics and practitioners.

The temporal development of the business model concept begins with the conceptualization of the term occurred, for the first time, in an academic article by Bellman et al., 1957. However, the term is mentioned in just one sentence and its meaning seems connected with a representation of reality through a model aimed at the construction of business games for workers training purposes.

Shortly after, Jones (1960) wrote the first academic article using the term in the title and abstract. Nevertheless, no mention of it is made in the text revealing the arbitrary use of the term by the author. Again, its meaning reflects a simplification of reality aimed at educating business college students on technology.

Thus, initially the term was used in a very unspecific manner. After that, it has been picked up regularly in the context of information technology [10] (IT) and was seen solely as an operative plan for creating a suitable information system [11] (IS) (Wirtz

[10] Information technology refers to the technology involving the development, maintenance, and use of computer systems, software and networks for the processing and distribution of data (Merriam-Webster).
[11] Information systems (IS) are combinations of hardware, software, and telecommunication networks that people build and use to collect, create, and distribute useful data, typically in organizational settings (Valacich et al., 2010).

et al., 2016). At that time, only Konczal (1975) referred to a possible future use of business model as a management tool.

Afterwards, as reviewed by Osterwalder et al. (2005), the term did not see widespread use for decades as confirmed by the low number of peer-reviewed journal papers published on business model until the 1990s with only five papers containing this word in their title. These authors carried out research in order to shed some lights on the origins and, particularly, the surge of the business model discussion by applying a method successfully used by Abrahamson et al. (1999) to study management discourse. It consists of tracing the appearance of a specific management term, in this case "business model", in a large number of journals to study its evolution. This was made possible by electronically searching the titles, abstracts, keywords and full texts of all articles in the Business Source Premier [12] database of scholarly business journals. In addition, for the sake of completeness, the search included several variations of the original term like new business model, Internet business model and e-business model.

The results are shown in Table II.1.

[12] Business Source Premier is the most widely used business research database featuring full text and searchable cited references for top journals covering a variety of business disciplines. (Source: EBSCO Industries, Inc.)

Table II.1 Occurrences of the term business model in scholarly reviewed journals

Year	In Title	In Abstract	In Keywords	In Full Text
1990	0	4	0	7
1991	0	1	0	10
1992	0	2	0	15
1993	0	5	0	18
1994	0	2	0	18
1995	0	4	0	36
1996	0	14	0	57
1997	1	14	0	66
1998	1	19	0	128
1999	3	42	1	262
2000	16	67	1	491
2001	11	100	7	609
2002	22	109	2	617
2003	30	159	10	667

Source: Osterwalder et al. (2005)

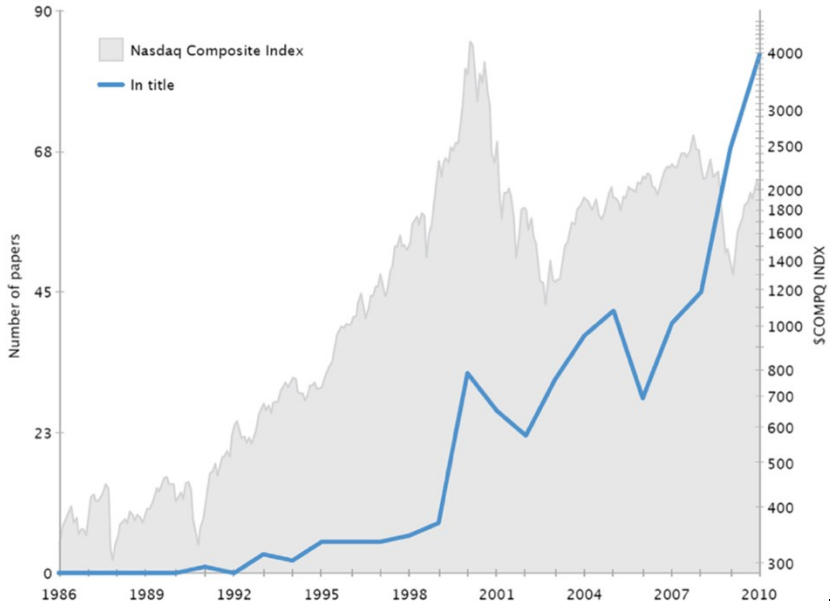
Table II.1 demonstrates that the popularity of business model is a relatively young phenomenon. Indeed, the term rose prominence, among both scholars and practitioners, only towards the end of the 1990s with the development of information and communication technologies (ICT)[13], the creation of electronic business[14], the emergence of Internet-based companies and the steep rise of the

[13] Information and communication technologies (ICT) refer to the communication technologies that provide access to information. These include the Internet, wireless networks, cell phones, and other communication mediums.
[14] Electronic business (e-business) is the conduct of business processes (e.g. customer relationship management, supply chain management etc.) on the Internet, while electronic commerce (e-commerce) is the process of buying and selling products/services via the Internet. Basically, e-commerce is a part of e-business.

Nasdaq[15] stock market index for technology-heavy companies. Congruently, the use of the term business model in academic papers closely followed the trend of the Nasdaq index from the early 1990s to the dot-com bubble (DaSilva et al., 2014). Basically, during this period, business model was seen mainly as a technology-oriented concept.

Figure II.1 depicts the number of papers with business model in either the title or as a topic appearing in academic journals compared to the Nasdaq composite index trend.

Figure II.1 Number of papers published on business models vs. the Nasdaq trend



Source: DaSilva et al. (2014)

[15] National Association of Securities Dealers Automated Quotations (NASDAQ) is a global electronic marketplace for buying and selling securities, as well as the benchmark index for United States (U.S.) technology stocks.

In a nutshell, the graph suggests that the widespread use of the business model terminology is intrinsically connected with technology-based companies.

Thornton et al. (2003) provide an explanation of the reasons behind this odd relationship. Notably, the dot-com bubble was a major driver of this phenomenon. The dot-com bubble was a speculative bubble and a period of excessive speculation brought about by an extreme growth in the use and adoption of the Internet. It took place in the United States roughly from 1994 to 2000. At that time, Internet-based companies could not be valued relying on their past performances because there were no precedents. That is why business models seemed to be the answer for explaining how innovative companies dealing with technologies or any other form of unclear but potentially profitable concepts, foreign to the logic of traditional industries, were materialized in business terms. Therefore, financial investors speculated about the compelling future promise based on their business models. Consequently, the Nasdaq composite stock market index, which included many new-born Internet-based companies, rose sharply during this period and peaked in value on March 10, 2000, before crashing. The burst of the bubble, known as the dot-com crash, lasted from March 11, 2000, to October 9, 2002. During the crash many of those companies failed and shut down (Wollscheid, 2012). The dot-com crash demonstrated the misuse of business model, meant for hiding the otherwise evident lack of strategy and poor revenue models of companies with fast growing stock prices but low or even non-existing profits. Although business model was

initially just a buzzword, the term survived the dot-com bubble. In fact, a closer look at the trend of Figure II.1 reveals that the number of papers with business model in their title remained relatively stable from 2004 to 2007 and began to grow again from 2008 onwards. This is because the ICT and the Internet revolutionized the way companies do business in virtually all industries, thus the stream of papers was characterized by a change in focus from the business model of Internet companies to the analysis of business models of brick-and-mortar companies ("general business").

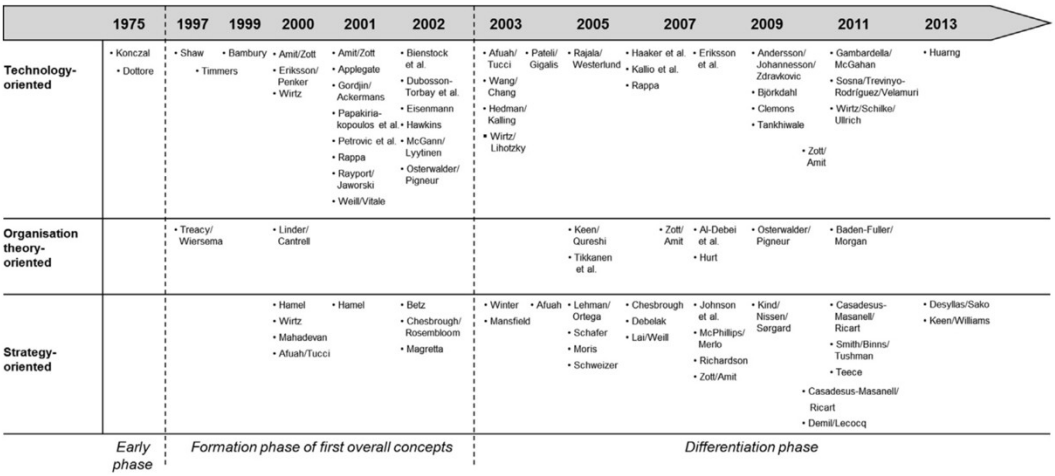
Within the further scientific discourse, the business model concept is strongly marked by a theoretical organization perspective developing into an approach to the abstract representation of a company's structure or architecture able to contribute to the success of management in the decision making-process (Al-Debei et al., 2008).

At the same time, aspects of strategy influence business model more and more. The strategic perspective and strategic components of business model gained increasing importance, both for the analysis of the competitive structure and the decisions concerning strategic innovation (Hamel, 2000).

This sustained interest in research is demonstrated by an increase in publications of practice-oriented and scientific books, and by special editions of scientific journals such as Long Range Planning.

Figure II.2 displays selected publications of business model research assigned to the three basic perspectives of technology, organization and strategy in the course of time.

Figure II.2 Literature overview of the business model research field



Source: Wirtz et al. (2016)

As depicted in Figure II.2, the temporal development of the business model research field is split into three phases:

- Early phase (1957-1975): business model is used in a very unspecific manner, and mostly in the context of information technology (IT) and information system (IS);
- Formation phase (1997-2002): business model is used in the context of information and communication technologies (ICT) and electronic business, with prevalence of technology-oriented articles;

- Differentiation phase (2003-2013): after the dot-com crash, business model gained greater significance as a management tool related to strategy and organization theory, even though the latter plays a subordinate role in the scientific discourse.

In recent years, the allocation of business model articles to the three basic perspectives of technology, organization theory and strategy has become increasingly difficult. In their articles, authors use concepts that refer to the aspects of all three basic perspectives. Therefore, the boundaries between these basic perspectives have become blurred and, consequently, an increasingly uniform business model understanding seems to be developing.

In conclusion, although the term business model can be found in the literature time and again, many basic questions remain. In fact, in spite of progressive development, the field of research is at a very early stage and there is still no clarity in the definition and purpose of the business model concept. The reason for the difficulty in answering these central questions is that the literature is very fragmented, due to its historical development and the varying perspectives of the authors.

To have a better understanding of the business model concept, the next paragraph summarizes the definitions of business model given by scholars over the years.

II.2. BUSINESS MODEL: AN OVERVIEW OF DEFINITIONS

Magretta (2002) considers business models as structured management tools especially relevant for company's success. Afuah (2004) also recognizes business model as the core reason behind the creation and success of many corporations, such as Microsoft, eBay, Walmart and Southwest Airlines. Moreover, a global IBM study reveals that financially successful companies attach around twice as much importance to consequential and sustainable business model management as less financially successful companies (IBM, 2007).

Therefore, to the business model concept is given a high significance both in scientific research and practice. However, as seen in the previous paragraph, the business model concept lacks uniform theoretical foundation due to its different theoretical basis (i.e., information technology, organisation theory and strategy). In fact, as pointed out by Lindman (2007), the academic community has acknowledged that the business model concept is still ill-defined and has not yet an established consensus regarding its meaning and purpose. This fuzziness led renowned scholars to even question its added value within the management literature. For example, Michael E. Porter stated that: «the definition of a business model is murky at best. Most often, it seems to refer to a loose conception of how a company does business and generates revenue. Yet simply having a business model is an exceedingly low bar set for bulding a company», and described the

business model approach to management as an «invitation for faulty thinking and self-delusion» (Porter 2001, p.73). In this context, it is no wonder that Osterwalder et al. (2005, p.1) and Teece (2010, p.175) affirm respectively that «business models are still relatively poorly understood, particularly as a research area», and that «the concept of a business model lacks theoretical grounding in economics or in business studies». In addition, the editor of the journal Long Range Planning (No. 2/3, 2010) stated that: «yet, there exist no clear body of literature in the academic or practitioner journals that explains how a business model works, what are its important dimensions and features and how a good business model can be created» (Wirtz et al., 2016, p.36). To fill this gap, the business model concept calls for greater conceptual clarity and rigor.

Table II.2 presents an overview of the various definitions of business model that scholars have proposed over the years, sorted by name of the author and year, by specifying the different definition basis.

Table II.2 Business model definitions

Authors	Year	Business model definition	Definition basis
Treacy et al.	1996	The business model priority is attached to processes that focus more on the actions and interactions of various company parameters.	Tasks/Purpose business model
Timmers	1998	Business model stands for the architecture for the product, service and information flows, including a description of the various business actors and their roles, the potential benefits for these actors and the source of revenues. The business model includes competition and stakeholders.	Architecture business model

Authors	Year	Business model definition	Definition basis
Eriksson	2000	A business model is an abstraction of how business functions. Business models as the possibility to present complex and multi-layered interrelations of a company in a clear and compressed manner.	Architecture/Tasks business model
Hamel	2000	A business model is simply a business concept that has been put into practice. A business concept has four major components: core strategy, strategic resources, customer interface, and value network.	Structural aspects business model
Linder et al.	2000	The business model is the organization's core logic for creating value. The business model for a profit-oriented enterprise explains how it makes money.	Architecture/Tasks/Purpose business model
Amit et al.	2001	A business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.	Purpose business model
Magretta	2002	Business models are stories that explain how the enterprises work. Business models describe as a system, how the pieces of a business fit together, but they don't factor in one critical dimension of performance: competition. A good business model has to satisfy two conditions. It must have a good logic - who the customers are, what they value, and how the company can make money by providing them that value. Second, the business model must generate profits.	Tasks/Purpose business model
Afuah et al.	2003	A business model is about the value that a firm offers its customers, the segment of customer it targets to offer the value to, the scope of products/services it offers to which segment of customers, the profit it chooses, its sources of revenue, the prices it puts on the value offered its customers, the activities it must perform in offering that value, the capabilities these activities rest on, what a firm must do to sustain any advantages it has, and how well it can implement these elements of the business model.	Architecture business model

Authors	Year	Business model definition	Definition basis
Osterwalder et al.	2005	A business model is a conceptual tool containing a set of objects, concepts and their relationship with the objective to express the business logic of a specific firm. Therefore, we must consider which concepts and relationships allow a simplified description and representation of what value is provided to customers, how this is done and with financial consequences.	Purpose business model
Voelpel et al.	2005	A business model is the particular business concept (or way of doing business) as reflected by the business's core value proposition(s) for customers; its configurated value network to provide that value, consisting of own strategic capabilities as well as other (e.g., outsourced/allianced) value networks; and its leadership and governance enabling capabilities to continually sustain and reinvent itself to satisfy the multiple objectives of its various stakeholders.	Architecture/Tasks business model
Johnson et al.	2008	A business model consists of four interlocking elements (customer value proposition, profit formula, key resources and key processes) that, taken together, create and deliver value. The customer value proposition and the profit formula define value for the customer and the company, respectively; key resources and key processes describe how that value will be delivered to both customer and the company.	Structural aspects business model
Teece	2010	A business model articulates the logic and provides data and other evidence that demonstrates how a business creates and delivers value to customers. It also outlines the architecture of revenues, costs, and profits associated with the business enterprise delivering that value.	Architecture/Purpose business model
DaSilva et al.	2014	Business models represent a specific combination of resources which through transactions generate value for both customers and the organization.	Tasks business model

Authors	Year	Business model definition	Definition basis
Wirtz et al.	2016	A business model is a simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component. In addition to the architecture of value creation, strategic as well as customer and market components are taken into consideration, in order to achieve the superordinate goal of generating, or rather, securing the competitive advantage. To fulfil this latter purpose, a current business model should always be critically regarded from a dynamic perspective, thus within the consciousness that there may be the need for business model evolution or business model innovation, due to internal or external changes over time.	Architecture/Tasks/Purpose business model
Teece	2018	A business model describes an architecture for how a firm delivers and creates value to customers and the mechanism employed to capture a share of that value. It is a matched set of elements encompassing the flow of costs, revenues and profits. The business model provides a pathway by which technological innovation and knowhow combined with the utilization of tangible and intangible assets are converted into a stream of profits.	Architecture/Tasks/Purpose business model

Source: our elaboration based on Wirtz et al. (2016)

According to Wirtz et al. (2016), it is possible to divide the various definitions of business model based on their content:

- Structural aspects of a business model: the definitions of business model focusing on structural aspects regarding its content refer to the mode of operations of a business model, emphasizing its components. (Hamel 2000 and Johnson et al., 2008);

- Architecture of a business model: the definitions of business model focusing on its architecture (or frame of references) refer to the core logics of a company (Timmers 1998; Eriksson et al., 2000; Linder et al., 2000; Afuah et al., 2003; Voelpel et al., 2005; Teece, 2010; Wirtz et al., 2016; and Teece, 2018);
- Tasks of a business model: the definitions of business model concerning its task emphasize that a business model should explain the relevant activities of a company and answer, if possible, all relevant questions regarding its financial success (Treacy et al., 1996; Eriksson et al., 2000; Linder et al., 2000; Magretta, 2002; Voelpel et al., 2005; DaSilva et al., 2014; Wirtz et al., 2016; and Teece, 2018);
- Purpose of a business model: the definitions of business model regarding its purpose identify the purpose of a business model in its general success and continuous development to assure the company a long-term competitive advantage (Treacy et al.,1996; Linder et al., 2000; Amit et al., 2001; Magretta, 2002, Osterwalder et al., 2005; Teece, 2010; Wirtz et al., 2016; and Teece, 2018).

In summary, over time, researchers seem to be approaching a consensus on what a business model is, its purpose, and its components.

In this thesis, we will refer to the definition of Teece (2018, p.40), given its completeness in defining the business model concept: «a business model describes

an architecture for how a firm delivers and creates value to customers and the mechanism employed to capture a share of that value. It is a matched set of elements encompassing the flow of costs, revenues and profits. The business model provides a pathway by which technological innovation and knowhow combined with the utilization of tangible and intangible assets are converted into a stream of profits».

Thus, a business model embodies the organizational and financial architecture of a business and reflects the hypothesis of management about what customers want, how they want it, how a company can organize to best meet those needs, get paid for doing so, and make a profit.

In short, the essence of a business model is «in defining the manner by which the company delivers value to customers, entices customers to pay for that value, and converts those payments to profit» (Teece, 2010, p.172).

II.3. BUSINESS MODEL AND DIFFERENCES WITH OTHER MANAGEMENT TERMS

The term business model often appears to encompass everything from, among others, business concept, business process modelling, revenue model, and economic model (DaSilva et al., 2014). However, although at first glance these terms may look similar in meaning, they are clearly distinct from each other.

II.3.1. Business model and business concept

Hedman et al. (2003), in a review of the literature about theoretical underpinnings of the business model concept, reveal that there are several similarities between the terms business model and business concept. In fact, earlier authors used both terms as synonyms without clarifying the distinction between them.

Some of them incorporate the business concept in their definition of business model. This is the case of, for example, Hamel (2000) and Voelpel et al. (2005, p.40) who define a business model as «a business concept that has been put into practice» and «the particular business concept (or way of doing business) », respectively.

Others argue that the business concept precedes the business model without, however, giving a clear explanation. This is the case of Lindman (2007), who states: «the development of new business concepts and the establishment of corresponding business models» (Lindman 2007, p.196).

DaSilva et al. (2014) assert, instead, that the business concept is any conceptualization of business reality, such as the business itself of a company along with its strategy and business model. This is in line with Applegate (2001), who defined the business concept as any of the following: a market opportunity, competitive dynamics, a strategic option for evolving the business, a strategy to obtain a dominant position, or the products and services offered.

It is exactly because of this broadness that the business concept remains fuzzy at best. Against this background, DaSilva et al. (2014) believe that the business concept will progressively disappear from the academic literature and make way for the business model, which is an increasingly more rigorous term.

II.3.2. Business model and business process modelling

During the dot-com bubble, between the late 1990s and the early 2000s, several authors used the terms business modelling and business process modelling interchangeably. Nevertheless, the two terms no longer overlap in the research community and the distinction between them seems to be clear by now (DaSilva et al., 2014).

In fact, business process modelling is an approach used to describe how businesses conduct their operations and typically includes graphical depictions of activities, events and control flow (Recker et al., 2009). Process modelling thus enables a more structured identification of the means by which transactions are executed within an existing business model.

DaSilva et al. (2014), based on the work of Ploesser et al. (2009), provide an example of business process modelling. Figure II.3 presents a simplified business process model of an airline company, Ryanair.

Figure II.3 Simplified business process model of Ryanair

Source: DaSilva et al. (2014)

II.3.3. Business model and revenue model

Within the literature, business model and revenue model have often been used as interchangeable terms (George et al., 2011). Actually, business model and revenue model are complementary yet distinct concepts. Amit et al. (2001, p.515) refers to revenue model as «the specific modes in which a business model enables revenue generation», by specifying the revenue sources, their volume and distribution. Thus, business model refers primarily to the means by which value is created whereas revenue model is a component of a business model that concerns primarily the appropriation of that value. In other words, a revenue model defines solely how revenue is generated by the company through the sale of its goods and/or services, and not how the company creates value in its entirety.

II.3.4. Business model and economic model

DaSilva et al. (2014) argue that, historically, an economic model has often used to describe what nowadays is considered to be a business model. Cicchetti et al. (1973)

define an economic model as «a mathematical description of both the determinants of behaviour and the jointly observed outcomes of this behaviour at a given point in time» (DaSilva et al., 2014, p.385). Hence, a business model defines, among other things, the logic of a company and the way it operates within an industry whereas an economic model provides an economic and mathematical rational specific to a company (i.e., profit function), industry (i.e., market structure of a given industry), or an economy as a whole. For example, in the case of Ryanair, the firm uses economic models in order to set flight prices through an analysis of the elasticity of demand allowing, thus, to draw mathematical correlations between their customers' expenditure on air fares, and expenditure on non-fare items.

Table II.3 summarizes the definitions of the concepts mentioned above.

Table II.3 Business concept, business process modelling, revenue model, and economic model definitions

	Definition
Business concept	A business concept is any conceptualization of business reality, such as the business itself of a company along with its strategy and business model
Business process modelling	Business process modelling is an approach used to describe how businesses conduct their operations and typically includes graphical depictions of activities, events and control flow.
Revenue model	A revenue model is the specific modes in which a business model enables revenue generation, specifying the revenue sources, their volume and distribution.
Economic model	An economic model is a mathematical description of both the determinants of behaviour and the jointly observed outcomes of this behaviour at a given point in time.

Source: our elaboration based on DaSilva et al. (2014)

II.4. BUSINESS MODEL DESIGN

Johnson et al. (2008) assert that business models are associated with securing and expanding competitive advantage.

For a company developing a successful business model is crucial to build a sustainable competitive advantage and make extra normal profits. In this regard, strategy analysis is an essential step in designing a competitively sustainable business model. Coupling strategy analysis to business model design requires segmenting the market, creating a value proposition for each segment, setting up the structure to deliver that value to customers, figuring out various isolating mechanisms[16] that protect whatever competitive advantage results from the design and implementation of a new business model and prevent imitation by competitors. Furthermore, the elements of a business model must be designed with reference to each other, to the business environment, and the trajectory of technological development of the industry.

Specifically, according to Teece (2010), a company, to design a business model, needs to determine the following elements:

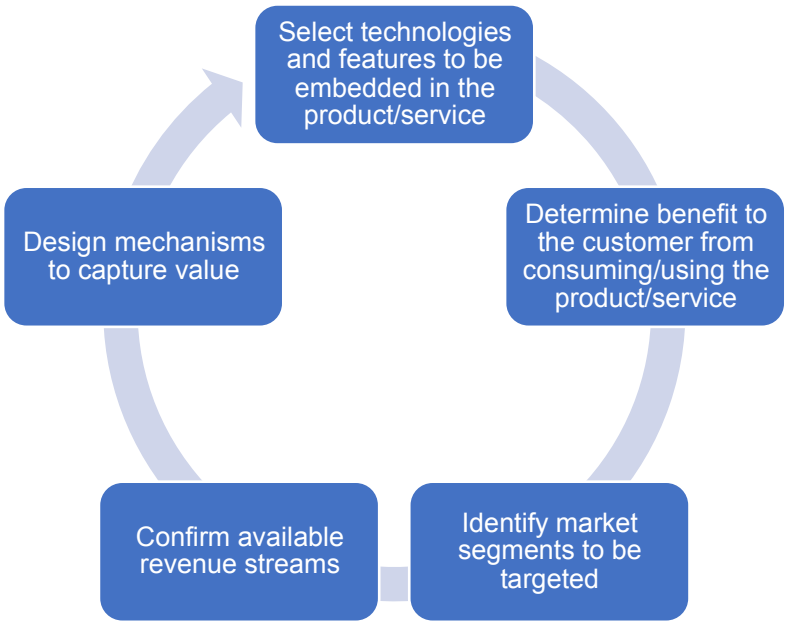
- the technologies and features to be embedded in the product/service;
- the benefit to the customer from consuming/using the product/service;

[16] Isolating mechanism (or mobility barriers) are the economic forces (i.e. intellectual property protection, economies of scale etc.) that limit the extent to which the competitive advantage of a company can be eroded through imitation by competitors.

- the market segments to be targeted;
- the revenues streams for the sale of the product/service;
- the mechanisms to capture value from customers.

Figure II.4 represents the elements that a company has to consider in designing a business model.

Figure II.4 Elements of business model design



Source: Teece (2010)

In essence, designing a business model means determining how to create value for customers, entice customers to pay for that value, and convert those payments to profits. Thus, the key issues in designing a business model are how to create value

for customers and how to capture a share of that value. It is not enough to do the first without the second.

A business model can be considered successful if it provides a compelling value proposition to customers and enables a significant value capture from sales of the product/service. Nevertheless, developing a good business model, no matter how novel, may be insufficient to assure a long-lasting competitive advantage. In fact, successful business models are very often imitated and become shared by multiple competitors.

However, often there are barriers against imitation of business models. In particular, there are three relevant factors that impede the copycat behaviour of rival companies that can quickly erode the business model pioneer's competitive advantage (Teece, 2010):

- implementing a business model may require systems, processes and assets that are hard to replicate;
- there may be a degree of uncertain imitability (Rumelt, 1982) that makes it difficult for competitors to understand in sufficient detail how a business model is implemented;
- even if for competitors it is transparently obvious how to replicate a business model, they may be reluctant to do so if it involves cannibalizing existing sales and profits and upsetting important business relationships.

In spite of the barriers to imitation, in practice, the basic idea and logic behind a new business model do not benefit from intellectual property protection and are, for this reason, often easy to imitate.

This is the reason why for entrepreneurs is important to consider a business model as provisional, in the sense that it is likely over time to be replaced by an improved model that takes advantage of further technological or organizational innovations (Shirky, 2008). In fact, having a differentiated and hard to imitate, and at the same time effective and efficient, business model is important to the establishment of a competitive advantage.

II.5. BUSINESS MODEL AND TECHNOLOGICAL INNOVATION

Technological innovation is often assumed to lead a company inexorably to commercial success. However, technological innovation by itself does not automatically guarantee a company's success.

A key element of business model design is figuring out how to capture value from technological innovation. Good business model design and implementation, coupled with strategic analysis that defines the go to market and capturing value strategies, are necessary to achieve commercial viability and build a sustainable competitive advantage.

Teece (2010) came up with "the profiting from innovation framework", a framework aimed at helping entrepreneurs in the design of business models. It delineates two antithetical models through which a company can capture value from technological innovation:

- the integrated business model, in which a company bundles the technology and product together and is responsible for the entire value chain including design, manufacturing, and distribution;
- the outsourced (pure licensing) business model. A company could license, and expect the licensing model to work, only if it has strong intellectual property rights. In fact, without them it is likely that the licensee will be the one who captures value from the innovation, at the expenses of the company.

Obviously, in between these two models there may be hybrid approaches involving a combination of them (e.g., outsourcing manufacturing).

The "profiting from innovation framework" thus helps to map business model selection to type of technological innovation, while simultaneously recommending when integration is likely to be viable or when licensing is more indicated.

The most traditional business model used to capture value from technological innovation is the integrated business model, where the consumers buy and pay for products that have intellectual property embedded within them (e.g., automobiles, smartphones etc.).

II.5.1. Business model innovation and technological innovation

Business model pioneers are those entrepreneurs who can figure out the needs of customers and design a suitable organization to better address these needs. To accomplish this goal, those entrepreneurs may or may not use new technology.

In this regard, Baden-Fuller et al. (2013) investigate the relationship between business model innovation and technological innovation. In fact, business models and technologies regularly interact. In particular, the authors distinguish between three situations in which business model and technology may interact:

- when business model innovation occurs through technological innovation.

In general, technological innovation can facilitate the development of new business models. For example, in the nineteenth century, the invention and development of steam power facilitated the emergence of the mass production [17] business model. Besides, technological change often provides the impetus for new and better ways to satisfy customer needs. For example, the railroad, then the auto and the airplane have all been technological solutions at the base of new business models aimed at satisfying the transport needs of society;

- when business model innovation occurs without technological innovation.

[17] Mass production is the production of large quantities of a standardized article by an automated mechanical process (e.g. assembly line).

For example, this is the case of the business model based on the just-in-time production system [18], introduced by the Japanese during the 1980s, that does not represent a real technological innovation. In other cases, a well-known business model can be applied and adapted in a new context without the need to invent a new one. For example, Amazon, at the beginning of its business activity, adopted the traditional mail-order business model pioneered by Sears Roebuck and applied it so as to work well also for books. Also EasyJet, a low cost European airline company, "copied" the business model pioneered by Southwest Airlines and adapted it to the European competitive environment;

- when business model innovation and technological innovation occur together.

For example, the two-sided dynamic search engine developed by Google in 2003 was both a technological innovation and a business model innovation. The novelty in this approach consisted in linking the two sides of the platform in a constantly changing manner to allow greater consumer satisfaction and greater revenues for any user on each side of the platform. In fact, one side of the platform provides an interface with advertiser whose choices directly influence the search experience of users on the other side of the platform.

In summary, as history demonstrates, new business models are often necessitated by technological innovation and, at the same time, new business models can

[18] Just in time is an inventory management method in which materials are scheduled to arrive or be restocked exactly when needed in the production process.

themselves represent a form of innovation. What is clear is that without a well-developed business model, an innovative company will fail to either deliver or to capture value from technological innovation (Teece, 2010). For this reason, companies often need to match technological innovation with business model innovation in order to capture value from it. Moreover, companies should constantly seek and consider improvements to business model, particularly improvements that are difficult to imitate and add value for customers since business model innovation may help to establish a competitive advantage.

II.6. BUSINESS MODEL AND DYNAMIC CAPABILITIES

II.6.1. Dynamic capabilities: definition and classification

According to Teece (2018), the design and operation of business models are dependent on the dynamic capabilities of a company.

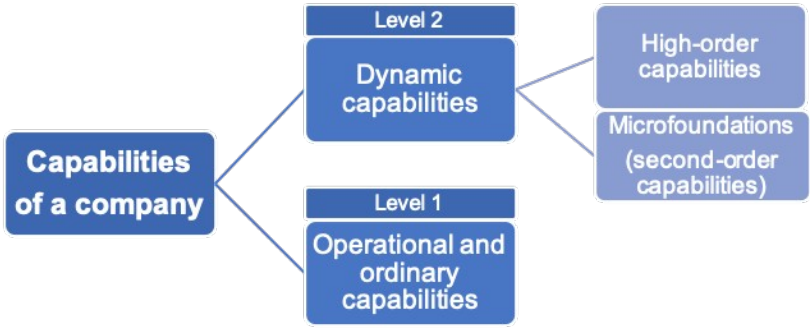
Dynamic capabilities are defined as «the capacity to anticipate, shape, seize opportunities and avoid threats while maintaining competitiveness by improving, combining, protecting and, when deemed necessary, rearranging the company's intangible and tangible assets» (Teece, 2009).

In other words, dynamic capabilities are «the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing

environments» (Teece et al., 1997, p.516). They also include the sensing, seizing, and transforming needed to design and implement a business model.

Figure II.5 presents a graphical representation of a company's capabilities levels, as asserted by Teece (2018).

Figure II.5 Capabilities levels of a company



Source: our elaboration based on Teece (2018)

Dynamic capabilities are included in the overall capabilities of a company, which can be divided into two levels (Teece, 2018):

- Level 1: operational and ordinary capabilities. At the base level are operational and other ordinary capabilities, such as the routine activities, administration, and basic governance that allow a company to pursue defined activities, for example a given production program, more or less efficiently;
- Level 2: dynamic capabilities. Above the operational and ordinary capabilities are a layer of dynamic capabilities, which can be divided in turn into:

- Microfoundations (second-order capabilities): involve the adjustment and recombination of existing ordinary capabilities as well as the development of new ones. They also include managerial decisions made under uncertainty, such as new product development or expansion into new sales regions;
- High-order capabilities: guide the second-order capabilities and support the management in devising, refining, and transforming the company's business model to seize new opportunities and determine the plans for the future. For example, a key high-order capability consists in the managerial competences in devising and refining business models.

An important characteristic of dynamic capabilities is their strength, where strong dynamic capabilities means strong with respect to those of competitors. The strength of dynamic capabilities is essential for a company, since it represents the ability to design and adjust its business model and maintain profitability over the long term. In fact, strong dynamic capabilities are the foundation for a sustainable competitive advantage since they are hard for competitors to replicate because they are built on the idiosyncratic characteristics of managers, routines and culture honed by the history of the company. This is especially true the more these capabilities are deeply embedded in the organization, and the less they are resident only in the top management. Furthermore, it determines the speed and degree of aligning the company's business model with the needs and aspirations of customers. To achieve this goal, the company must be able to continuously transform the way of doing

business and its corporate culture in order to address threats and opportunities as soon as they arise.

II.6.2. Business model, dynamic capabilities and strategy

Porter (2001, p.71) defines strategy as «a way of competing that delivers unique value in particular set of uses or for particular set of customers, […] and how all the elements of what a company does fit together». Essentially, strategy maps out in broad terms how the company will compete in the market.

At first sight, this definition of strategy seems to be almost identical to that of business model given by Magretta (2002, p.91): «business models describe as system, how the pieces of a business fit together».

Actually, business model differs from strategy to a great extent. In fact, Casadesus-Masanell et al. (2010,) emphasize that: «strategy and business model, though related, are different concepts: a business model is the direct result of strategy but is not, itself, strategy» (p.212). Thus, «business models are reflections of the realized strategy» (p. 195), even though «every organization has some business model» but «not every organization has a strategy» (p.206).

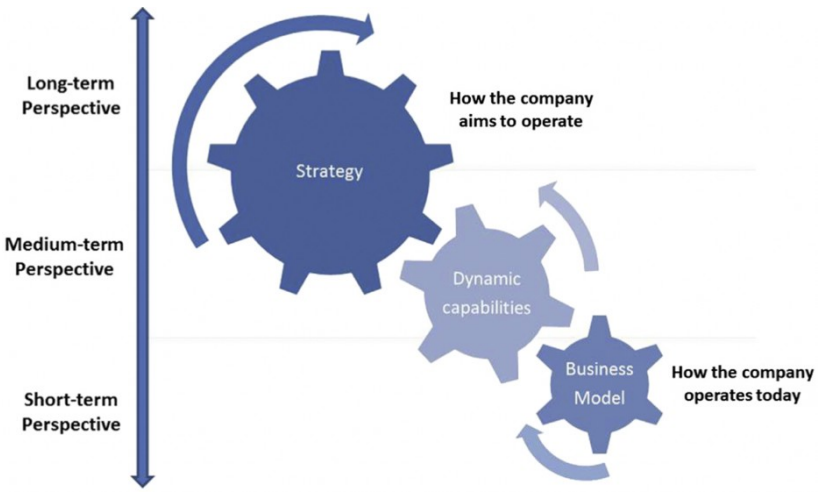
According to Ambrosini et al. (2009), strategy, dynamic capabilities and business model are interrelated concepts. Indeed, strategy is about building dynamic

capabilities aimed at responding efficiently to existing or future contingencies that can alter the business model of a company.

It often leads to abandoning an old business model for a new one in order to create and maintain a distinct competitive advantage in the marketplace (Casadesus-Masanell et al., 2011).

Figure II.6 illustrates the time horizon in which the concepts of business model, dynamic capabilities, and strategy are placed.

Figure II.6 Time horizon of business model, dynamic capabilities, and strategy



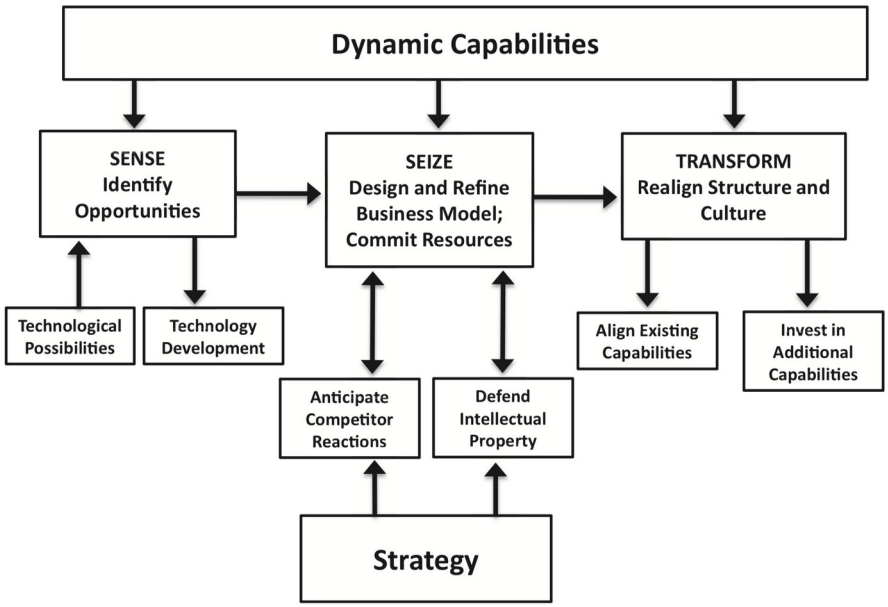
Source: DaSilva et al. (2014)

As it can be figured out from Figure II.6, strategy is a long-term perspective that reflects what a company aims to become in the future; dynamic capabilities are a medium-term perspective; and business model is a short-term or present perspective

that describes what a company really is at a given time. Specifically, strategy sets up dynamic capabilities which then constrain the capacity of a business model to respond to either existing or upcoming contingencies.

The interrelation between strategy, dynamic capabilities, and business model is further analysed by Teece (2018), who came up with a dynamic capabilities framework that reflects this interdependence. The dynamic capabilities framework is a multidisciplinary model of a company with dynamic capabilities at its core. Figure II.7 depicts the framework.

Figure II.7 Dynamic capabilities framework



Source: Teece (2018)

The dynamic capabilities framework represented in Figure II.7 combines dynamic capabilities and strategy in order to design and refine a defensible business model

for the purpose of maintaining a competitive advantage and, therefore, an adequate level of profit over the long term.

According to Casadesus-Masanell et al. (2011, p.100), «strategy has been the primary building block of competitiveness over the past three decades, but in the future, the quest for sustainable advantage may well begin with the business model». Although this statement is correct, it is more accurate to say that unique dynamic capabilities are the primary building block of a company's competitiveness because they enable business model design, which in turn is connected to strategy.

To cement all three concepts, DaSilva et al. (2014) provide a useful example of the low-cost airline company Ryanair. The strategy of Ryanair is to attract customers by reducing the perceived fare price to the lowest possible compared to other airlines. This strategy has led the company to devise its dynamic capabilities such as strong bargaining power with aircraft suppliers, airports, and staff; and an experienced legal department able to respond to lawsuits. As a result, these dynamic capabilities enhance the company's ability to take advantage of opportunities through the transformation of its business model, where the company's business model consists of the combination of resources (i.e., standardized airline fleet) and consequent transactions (i.e., bookings allowed only through the company's

website to minimize transaction costs) that generate value for both customers (i.e., low fare prices) and the company (i.e., low variable costs).

II.6.3. Business model and dynamic capabilities interactions

There are important interactions between a company's business model and its dynamic capabilities. Indeed, dynamic capabilities enable business model in the sense that a dynamic company will be able to rapidly implement, test, and refine new and revised business models. Thus, the successful creation and implementation of a business model draws on strong core dynamic capabilities.

The areas in which business model interacts with dynamic capabilities are (Teece, 2018):

- Business model innovation

A successful business model is the one that provides a customer solution that can support a price high enough to cover all costs and leave a satisfactory profit (Teece, 2018). For a company, being able to select, adapt, and match a business model with the competitive environment is a dynamic capability. In most cases, the development of such a business model starts with the understanding of the customer's needs and the awareness of other business models that already exist.

In developed and highly competitive economies it is difficult, but not impossible, to invent an entirely new business model. A driver for business model innovation is represented by technological progress. This was the case of the Internet at the beginning of the twenty-first century. Nowadays, the emergence of the Internet of things (IOT)[19] will accompany a new wave of business model innovation.

In reality, for companies a new business model will be similar to older ones, involving a hybridization of existing models. The choice of what kind of business model to consider depends, in part, on the strength of the firm's dynamic capabilities (Teece, 2016). Companies with weak dynamic capabilities will be more likely to lean on existing business models, while companies with strong dynamic capabilities have greater freedom to contemplate innovative business models that entail radical shift of resources or activities.

- Organizational design

Business model and dynamic capabilities also interact in the area of organizational design. In particular, in the following dimensions:

- Rigidity or flexibility of a company: usually, companies tend towards rigidity because the perfection of existing procedures is a more natural goal than devising new ones. However, to rapidly implement and adjust a new business

[19] In the Internet of things (IOT) formerly stand-alone physical objects are given the ability to sense and communicate details of their status and environment.

model, an organization, in addition to have strong dynamic capabilities, has to be flexible so that innovation can occur;

- Make or buy decisions: once selected a business model, the management must decide which activities will be performed within the company and which will be outsourced. Through astute make or buy decisions the company frees up resources that can be utilized for other activities. For example, nowadays many companies offer cloud computing services. By outsourcing the maintaining of non-critical data to these companies, a firm can utilize more resources, for example, for digitizing its existing business or designing a new digital business model;
- Business model choices vs investment choices: some company's decisions are simply investment choices that do not have implications for the business model. For example, in general and excluding the case of energy companies, if a company decides to generate its own electricity it is making a business model choice. However, how the electricity is generated (through solar power or wind power) is an investment choice, that does not impact the way the business is run (i.e., the way the customer value is delivered and priced);
- Intellectual property (IP): a central issue in business model design relates to the control and use of intellectual property (IP). In fact, in the dynamic capabilities framework (see Figure II.7) controlling and defending the IP is a choice variable;

- Multinational aspects of a company: in the case of multinational corporations, they can experiment with different business models in different geographies. Although they can transfer their business model to all geographies where they can capture value, they may need to modify their business model to suit local requirements (Teece, 2014b). For example, in China Starbucks had to accommodate its business model by adding more food options and providing larger spaces where groups could sit for long periods (Bolt, 2005).

II.7. CONCLUSIONS

In this chapter we first retraced the historical development of the business model concept from its origins to its diffusion. At the beginning, in the 1960s, the term business model was used in a very unspecific manner. Later on, the term did not see widespread use until the 1990s. Indeed, in the late1990s, the term finally rose prominence with the development of information and communication technologies (ICT). Although during this period the business model was seen mainly as a technology-oriented concept, in the early 2000s it was influenced by organization theory and strategy more and more.

We then provided an overview of the business model's definitions proposed by authors over time to better understand the concept, its objective and components. We started by analysing the definition of Treacy et al. (1996) up to that of Teece

(2018). The latter is the definition of business model we will refer to in this thesis: «a business model describes an architecture for how a firm delivers and creates value to customers and the mechanism employed to capture a share of that value. » (Teece, 2018, p.40).

Once defined what a business model is, for greater conceptual clarity, we distinguished between business model and related concepts such as business concept, business process modelling, revenue model, and economic model. In fact, even though at first glance these terms may look similar they are not synonyms but, instead, well-differentiated concepts.

An important aspect we considered is business model design, the elements needed to design a good business model, and the correlation between successful business models and competitive advantage.

Furthermore, we analysed the interactions between business model and technological innovation and how this may lead to a competitive advantage. In particular, there are three situations in which business model and technology may interact: when business model innovation is triggered by technological innovation, when business model innovation occurs without technological innovation, and when business model innovation and technological innovation are connected.

Finally, we investigated the relationship between business model and dynamic capabilities and their role in the formation of a competitive advantage. We defined

what dynamic capabilities are, their levels, and their characteristics. We then take into consideration the interrelations between business model, dynamic capabilities, and strategy. In particular, the areas in which business model and dynamic capabilities interact are business model innovation and organizational design.

In conclusion, we can state that the business model and its interrelations with other concepts such as technology, dynamic capabilities, and strategy are aimed at the establishment of a company's sustainable competitive advantage.

CHAPTER III - THE BUSINESS MODEL ANALYSIS OF ENEL X

III.1. BUSINESS MODEL ANALYSIS METHODOLOGY

The aim of this last chapter is to analyse the business model of a company: Enel X.

In detail, we will analyse the business model that Enel X utilizes in Italy for the electric mobility market.

In order to carry out this analysis, we will apply the theoretical concepts described in the previous chapter to the business case. In particular, the analysis is based on the research of Teece (2010) (2018) about the relation between business model, strategy, dynamic capabilities, technological innovation, and regulations; and is complemented by corporate documents (i.e., balance sheet and annual financial report) and other sources (i.e., information of the company's website and reports).

First, we will provide a general description of the company. Next, we will describe the company's strategy and dynamic capabilities, given their relationship with the company's business model. Finally, we will attempt to predict the viability of the company's business model in the long term based on the role of technological innovation and current regulation in the electric mobility industry, since, as we will see, the latter and the company's business model are interrelated.

III.2. ENEL X: OVERVIEW OF THE COMPANY

Enel X is an Italian company established in 2017 as a subsidiary (100% controlled) of Enel S.p.A.

In detail, Enel X is one of the business lines of Enel alongside Global thermoelectric generation, Global trading, Infrastructure and global networks, and Enel green power.

Enel X does business in the following geographical areas: Italy, Iberia (i.e., Spain and Portugal), Europe and euro-Mediterranean affairs, North and Central America, and South America (Enel, annual financial report, 2018).

The value proposition of Enel X is based on a complex product/service portfolio aimed at addressing new customer needs with innovative technologies. Specifically, it is structured in four global product lines in order to capitalise upon the power industry transformation (Enel, sustainability balance sheet, 2018):

- e-City: concerns public and artistic lighting, energy efficiency and safety, and fiber optics;
- e-Home: concerns the development of "smarter" homes, able to reduce energy consumption and ensure greater well-being, and the generation of energy from renewables (e.g., solar power) with integrated solutions that also include energy storage;

- e-Industries: concerns the provision of an integrated and tailored service that includes strategic advice to customers, energy monitoring systems and efficiency technologies, distributed generation, intelligent battery use, microgrid solutions connected to the network, and the most advanced demand response[20] systems;
- e-Mobility: concerns the promotion of electric mobility with increasingly innovative solutions and new technologies, such as recharging infrastructure and second life battery systems.

In summary, Enel X provides low power, smart, led lighting solutions and fiber optics for cities; demand response and storage solutions for commercial and industrial customers; energy efficiency solutions; and electric mobility fast recharging services.

In a nutshell, Enel X proposes itself as a "circular accelerator" with the aim of leading the transformation of the energy sector by changing industry paradigms, creating a "new power economy", and carving out an innovative and unique role in the market.

In conclusion, as already mentioned in the introduction, for the purpose of this thesis and the following business model analysis, we will only focus on the business

[20] Demand response can be defined as the changes in electricity usage by end-use customers from their normal consumption patterns in response to changes in the price of electricity over time. It includes all intentional electricity consumption pattern modifications by end-use customers that are intended to alter the timing, level of instantaneous demand, or total electricity consumption (Albadi et al., 2008).

model Enel X employs in Italy for the global product line "e-Mobility" (electric mobility).

III.3. THE BUSINESS MODEL ANALYSIS

In this section we will analyse the business model that Enel X utilizes in Italy for the electric mobility sector. Specifically, the analysis will focus on the functioning of the company's business model and its long-term viability.

On the one hand, as for the first aspect, the functioning of a company's business model is strongly interrelated with its strategy and dynamic capabilities [21]. Indeed, strategy sets up dynamic capabilities that then constrain the capacity of a business model to respond to either existing or upcoming contingencies (DaSilva et al., 2014).

On the other hand, as for the second aspect, the company's business model is influenced, among other things, by technological innovation[22] and regulations, which can determine both positively and negatively its long-term viability.

Therefore, we will first describe the company's strategy and dynamic capabilities, followed by a research on the functioning of its business model. Afterwards, we will endeavour to forecast the long-term viability of the company's business model

[21] See subparagraph II.6.2
[22] See paragraph II.5

based on the technological innovation and the role of regulations in the electric mobility sector.

II.3.1. The strategy of Enel X

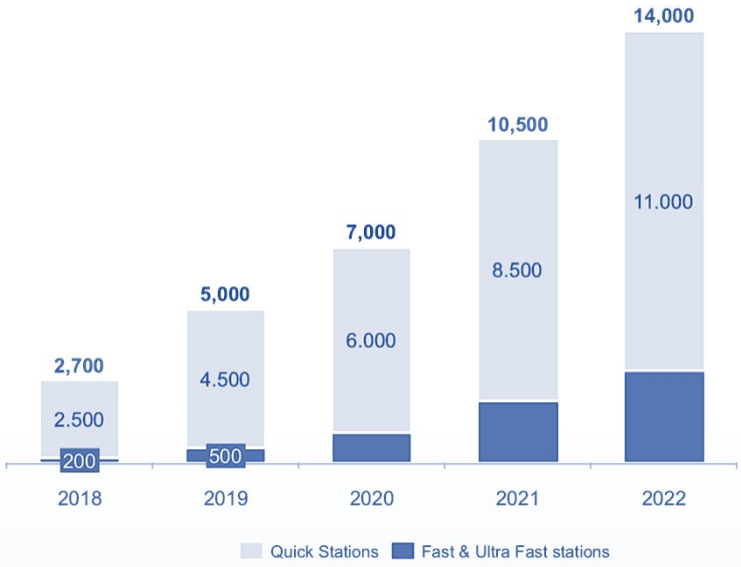
As already described [23], strategy and business model, though related, are different concepts. In fact, as stated by Casadesus-Masanell et al. (2010, p.212), «a business model is the direct result of strategy but is not, itself, strategy». In other words, a business model is the reflection of the company's realized strategy.

For this reason, it is critical to first define the strategy adopted by Enel X before moving on to the study of its business model.

As regards electric mobility, the strategy of Enel X is to widely diffuse the recharging infrastructure across the country. The strategic goal, as shown in Figure III.1, is to install 14 thousand recharging points by 2022.

[23] See Paragraph II.6.2

Figure III.1 Enel X recharging infrastructure plan in Italy



Source: Enel X corporate documents

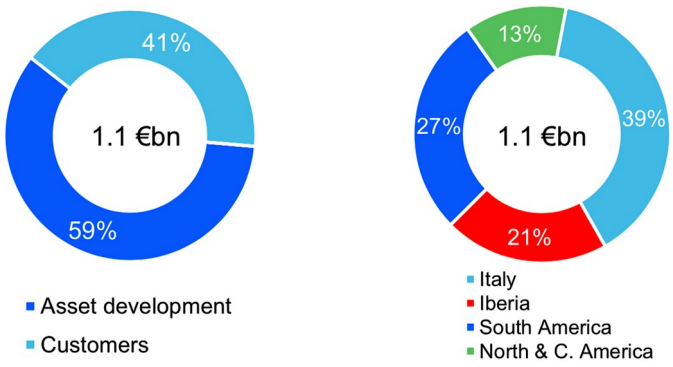
In detail, in order to promote the spread of electric mobility in Italy, Enel X has launched a national recharging infrastructure plan, that provides comprehensive coverage in all Italian regions, for the installation of about 7 thousand recharging stations by 2020, reaching 14 thousand in 2022 (i.e., quick, fast, and ultra-fast stations).

The strategy of Enel X is supported by the investments included in the strategic plan for 2019-2021 of Enel. The strategic plan 2019-2021 provides total investments of €27.5 billion in order to support the corporation's growth.

As shown in Figure III.2, for the development of Enel X are earmarked investments of €1.1 billion (i.e., 4% of €27.5 billion). In detail, the investments are balanced

between asset development (i.e., new urban infrastructure) and customers (i.e., customer services) and divided between the geographical areas where the company does business. The goal of these investments is to seize the opportunities that may emerge from the market and to address the customer's needs.

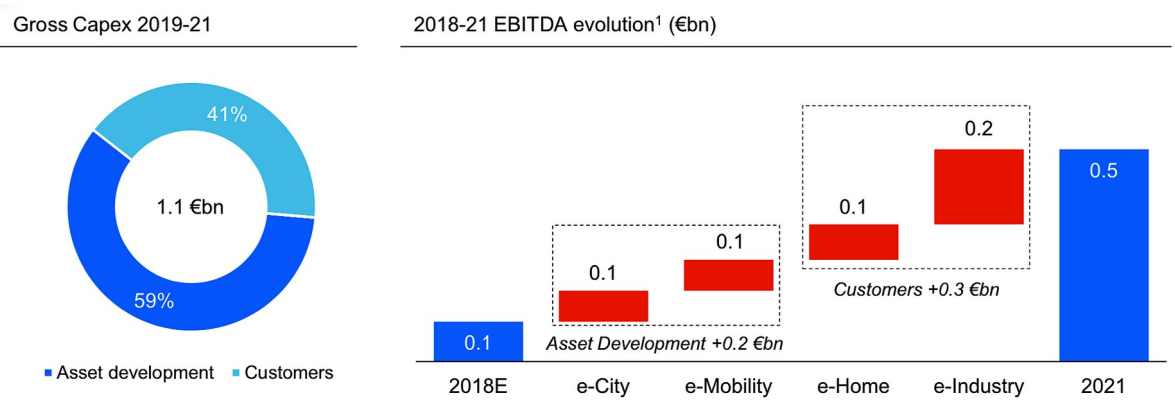
Figure III.2 Enel X total investments 2019-2021



Source: Enel corporate documents

As depicted in Figure III.2, €649 million (i.e., 59% of €1.1 billion) and €451 million (i.e., 41% of €1.1 billion) are earmarked for asset development and customers, respectively. Regarding the geographical areas our focus is on Enel X's investments in Italy for the recharging infrastructure, which amount to €429 million (i.e., 39% of €1.1 billion).

Besides, as shown in Figure III.3, the EBITDA[24] growth target to be reached during the duration of the plan is €400 million, where e-Mobility will contribute to its growth for €100 million.



Source: Enel corporate documents

In conclusion, since the strategy of Enel X is to diffuse the recharging infrastructure, its business model (which functioning will be described later) needs to offer a superior value proposition to customers, and capture a greater part of that value, than the one of competitors in order to justify the investment for the expansion of the recharging infrastructure.

[24] EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) is an accounting measure calculated using a company's earnings, before interest expenses, taxes, depreciation, and amortization are subtracted. It is used as a proxy for a company's current operating profitability (i.e., how much profit it makes with its present assets and its operations on the products/services it produces and sells, as well as providing a proxy for the cash flow, that is the net amount of cash being transferred in and out of a business).

II.3.2. The dynamic capabilities of Enel X

Dynamic capabilities are «the capacity to anticipate, shape, seize opportunities and avoid threats while maintaining competitiveness by improving, combining, protecting and, when deemed necessary, rearranging the company's intangible and tangible assets» (Teece, 2009).

As previously mentioned, dynamic capabilities constrain the capacity of a business model to respond to either existing or upcoming contingencies (DaSilva et al., 2014). Therefore, the operation of a business model depends, among other things, on the dynamic capabilities of a company (Teece, 2018).

For this reason, as a necessary step of the business model analysis, the goal of this section is to identify the dynamic capabilities of Enel X and investigate the impact they have on the capacity of the company's business model to respond to either existing or upcoming contingencies.

Enel X is a company operating in an emergent industry, electric mobility, that will most likely undergo many changes and only fully develop in the coming years. Therefore, we can assume that the dynamic capabilities of Enel X are the research and development activities coordinated with key companies operating in the electric mobility industry. In fact, Enel X has signed agreements with some automotive companies, such as Fiat Chrysler Automobiles (FCA) and Nissan, with the aim of designing and developing new technologies, products and/or services and

promoting the diffusion of electric mobility. As a result, through its dynamic capabilities, Enel X should be able to anticipate changes in the electric mobility market and seize new opportunities that may arise from technological innovation in the industry in order to maintain competitiveness in the long term. The dynamic capabilities of Enel X thus shape the capacity of the company's business model to adapt to present and future contingencies.

In addition, an important characteristic of dynamic capabilities is their strength, where strong dynamic capabilities means strong with respect to those of competitors. In fact, the strength of dynamic capabilities is crucial for a company because strong dynamic capabilities are the foundation of a sustainable competitive advantage as they are hard for competitors to replicate since they are built on the idiosyncratic characteristics of a company (Teece, 2018).

Currently, in the market of recharging services for electric vehicles we can assume that Enel X has stronger dynamic capabilities than those of competitors. In fact, competitors have neither the investments made by Enel X to develop the recharging infrastructure (i.e., about 400 million) nor the "political power" to sign synergies with the most important automotive companies.

In conclusion, we can assume that the dynamic capabilities of Enel X represent a crucial element in the company's capacity to adapt its business model to changes

that may arise in the electric mobility industry and maintain competitiveness in the long term.

II.3.3. The business model of Enel X

As previously discussed in chapter II, the identification of strategic objectives and dynamic capabilities is propaedeutic to the definition of a sustainable and viable business model.

In spite of the fact that practically declining the business model concept is difficult at best, in order to determine the functioning of Enel X's business model we will refer to the definition proposed by Teece.

A business model «describes an architecture for how a firm delivers and creates value to customers and the mechanism employed to capture a share of that value. The business model provides a pathway by which technological innovation and knowhow combined with the utilization of tangible and intangible assets are converted into a stream of profits» (Teece, 2018, p.40).

In short, the essence of a business model is «in defining the manner by which the company delivers value to customers, entices customers to pay for that value, and converts those payments to profit» (Teece, 2010, p.172).

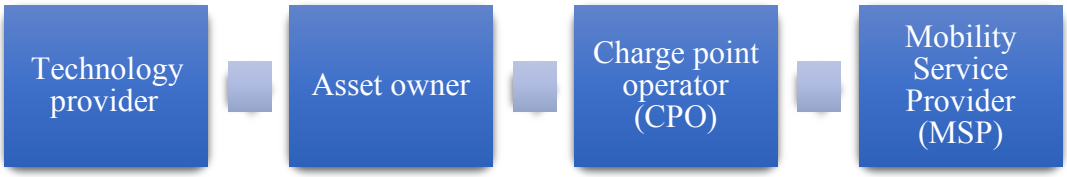
Therefore, it is rather clear that a business model is based on the following dimensions: value creation, value delivery and value capture.

In order to discuss how Enel X performs its activities to be compliant with the above dimensions, it may be useful to describe its value chain.

In general, Enel X intends to be an enabler of electric mobility, that is a provider of a complete technologically advanced product and service portfolio so as to satisfy multiple customer needs. Specifically, our attention is focused on the public (i.e., accessible to the public) recharging service provided by the company.

Figure III.4 depicts the public recharging service value chain of Enel X.

Figure III.4 Enel X public recharging service value chain



Source: our elaboration based on Enel X corporate documents

As can be seen in Figure III.4, Enel X employs a so-called "integrated business model" in which a company bundles the technology and product together and is responsible for the entire value chain (Teece, 2010).

First and foremost, Enel X is a full stack technology provider, that is a company that develops a technology providing the end customer with a complete product or

service, and which handles the entire value chain of its activity. As a full stack technology provider, Enel X owns and develops the intellectual properties for the electric vehicles recharging stations. In particular, the recharging stations vary from AC Type 2 3.7kW to AC Type 2 22kW, and DC 50kW for CCS and CHAdeMO standards[25].

Secondly, the company is an asset owner in the sense that it owns the recharging stations and aims at widely spreading its own recharging infrastructure seeing as how the latter is crucial for the achievement of the aforesaid strategic goal.

Thirdly, Enel X acts as a charge point operator (CPO), meaning that the company is entitled to the management and maintenance of the recharging stations. The latter activity is performed by employing advanced management tools such the Electric Mobility Management System (EMM) platform.[26]

Finally, Enel X acts as a mobility service provider (MSP). To this extent, the company sells recharging services to the end customers. In detail, through the JuicePass app, it provides the following services: recharging station localization on

[25] AC: alternating current; DC: direct current.
Type 2: it is the connector used for charging electric vehicles within Europe.
CCS: the combined charging system (CCS) covers charging electric vehicles using the Combo 2 connectors (i.e., an extension of the Type 2 connector, with two additional direct current contacts to allow high-power DC fast charging).
CHAdeMO: it is the trade name of a quick charging method for battery electric vehicles.
[26] The Electric Mobility Management System (EMM) platform allows remote cloud-based monitoring and the management of all recharging station functions.

map with integrated navigation system, recharging stations real-time availability, visualization of booking service, recharging status as well as monetary transactions.

In a nutshell, the synergic and coordinated management of these correlated activities allows the company to "create", "deliver" and "capture" the value.

Although it is challenging to identify a perfect match between each activity of the value chain and the value dimensions, it can be fairly assumed that Enel X:

- creates value throughout the first three stages of the value chain (i.e., technology provider, asset owner and charge point operator); and
- delivers and captures value when it acts as a mobility service provider (i.e., when it provides the recharging service to the customers and get paid for that).

In conclusion, Enel X's business model for electric mobility is also inspired by circular economy principles. In particular, its value proposition supplies "a product as a service", that consists in providing a service rather than selling products[27].

In other words, the company offers the recharging service to customers (i.e., the service) by retaining the ownership of the recharging stations (i.e., the products).

So far, the discussion investigated the functioning of the company's business model. However, for the sake of completeness and as already mentioned above, a sufficiently adequate analysis must also include how technological evolution and

[27] See paragraph I.5.8

regulation shape the viability and sustainability of the business model in the long term. The next two sections will thus deal with these two aspects.

II.3.4. The technological evolution of the electric mobility industry

The recharging infrastructure for electric-powered vehicles and the electric mobility market are closely interrelated, as the recharging infrastructure depends on the electric vehicles[28] market and vice versa. On the one hand, the diffusion of the recharging infrastructure on the territory is influenced by the growth of the electric mobility market. In fact, an increase in sales of electric vehicles will result in the widespread use of the recharging infrastructure. On the other hand, the electric mobility market is influenced by the degree of diffusion on the territory of the recharging infrastructure. In fact, the close availability of the recharging infrastructure is a necessary condition for the take-off of the electric mobility market.

Therefore, in analysing the business model of Enel X we have to take into consideration the development of the electric mobility industry, as it affects its viability and profitability in the long term.

[28] Electric vehicle means a motor vehicle equipped with a powertrain containing at least one non-peripheral electric machine as energy converter with an electric rechargeable energy storage system, which can be recharged externally (Directive 2014/94/EU, art.2).

What will follow is an analysis of the electric mobility industry, the factors that drive its evolution and the trend of the industry. As regards the trend of the electric mobility industry, we consider both the international scenario as well as the Italian one. We will then draw our conclusions on how the business model of Enel X is influenced by the electric mobility industry focusing on the Italian market (since, as we have already said, we analyse the business model of Enel X in Italy).

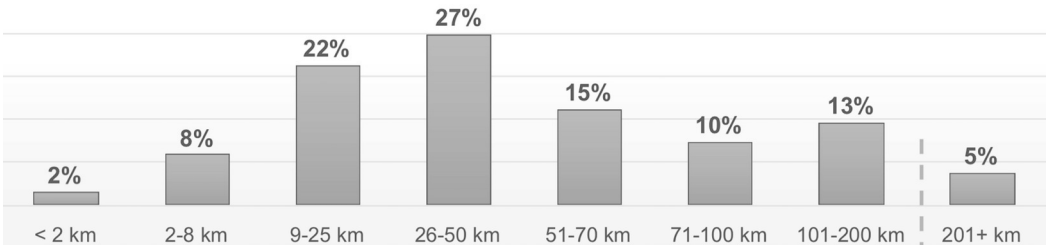
Currently, the electric mobility industry must address some barriers in order to boost the market. In detail, these barriers are the infrastructure gap (i.e., the diffusion of the recharging infrastructure), the range anxiety, and the price of electric vehicles.

As already mentioned, the diffusion of the recharging infrastructure depends on the growth of the electric mobility industry and vice versa. Therefore, the electric mobility industry needs more coverage by the recharging infrastructure (specially to ensure long-haul travel) as much as the recharging infrastructure needs the widespread use of electric vehicles. As regards Enel X, we have already described its strategic goal to install in Italy 14 thousand recharging stations by 2022, thus overcoming the infrastructure gap and promoting the development of electric mobility (at least in Italy).

The range anxiety is the fear that a vehicle has insufficient range to reach its destination. The range (i.e., the distance that can be covered by a vehicle without

refuelling) of electric vehicles depends on their battery capacity. At the present time, the average battery capacity is between 30kWh and 40kWh and the maximum guaranteed range on average is 200 km. As Figure III.5 demonstrates, the range of electric vehicles already guarantees daily travel.

Figure III.5 Percentage of daily travel per mile-long range travelled

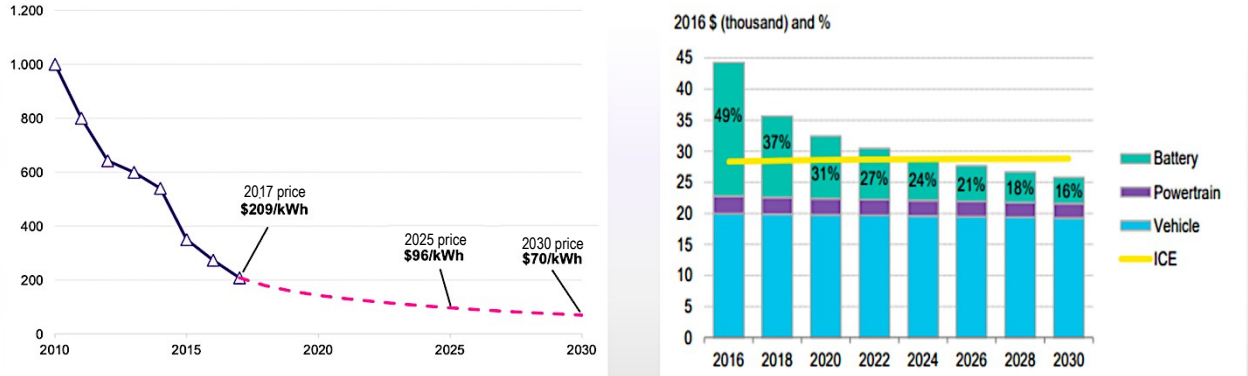


Source: National Household Travel Survey (2011)

In fact, the range of electric vehicles ensures about 90% of daily travel (i.e., from 2 km to 200 km). Still, about 5% of daily travel (i.e., more than 200 km) are not yet covered. However, the further technological development of electric vehicles batteries will result in an increase in their range (i.e., 300-400km), thus guaranteeing all daily travel.

As regards the price of electric vehicles, currently, it is higher than the one of the traditional vehicles (i.e., internal combustion engine vehicles), thus hindering the mass diffusion of the electric vehicles. Nevertheless, in the coming years, as represented in Figure III.6, the lithium-ion battery prices drop will be the main technology driver of the electric vehicles mass market.

Figure III.6 Price of lithium-ion batteries and price of electric vehicles compared to that of traditional vehicles



Source: Bloomberg (2018)

Figure III.6 presents two graphs. The graph on the left describes the price trend of the lithium-ion batteries over time, while the graph on the right compares the price of electric vehicles with that of traditional vehicles over time. In particular, in the graph on the left the dotted line (i.e., violet line) represents the observed decreasing price trend of lithium-ion batteries from 2010 to 2017, while the dashed line (i.e., pink line) represents the estimated decreasing price trend of lithium-ion batteries from 2017 onwards. In fact, there will be a strong price reduction of the lithium-ion batteries, namely from $209/kWh of 2017 to $70/kWh of 2030, due to the technological progress in this field. Furthermore, the strong price reduction of lithium-ion batteries affects the price of electric vehicles. In fact, as represented by the graph on the right, the main components of the cost of an electric vehicle are

the lithium-ion battery, the powertrain[29] and the vehicle itself. As can be seen from the graph, the lithium-ion battery is the main cost component of an electric vehicle. Therefore, the falling lithium-ion battery prices will result in decreasing prices for electric vehicles over time. In fact, by comparing the price of electric vehicles (i.e., the height of the columns) and the price of traditional vehicles (i.e., the solid yellow line), it is clear that the price of electric vehicles is expected to undercut that of traditional vehicles by mid-2020s, thus contributing to the electric vehicle mass market.

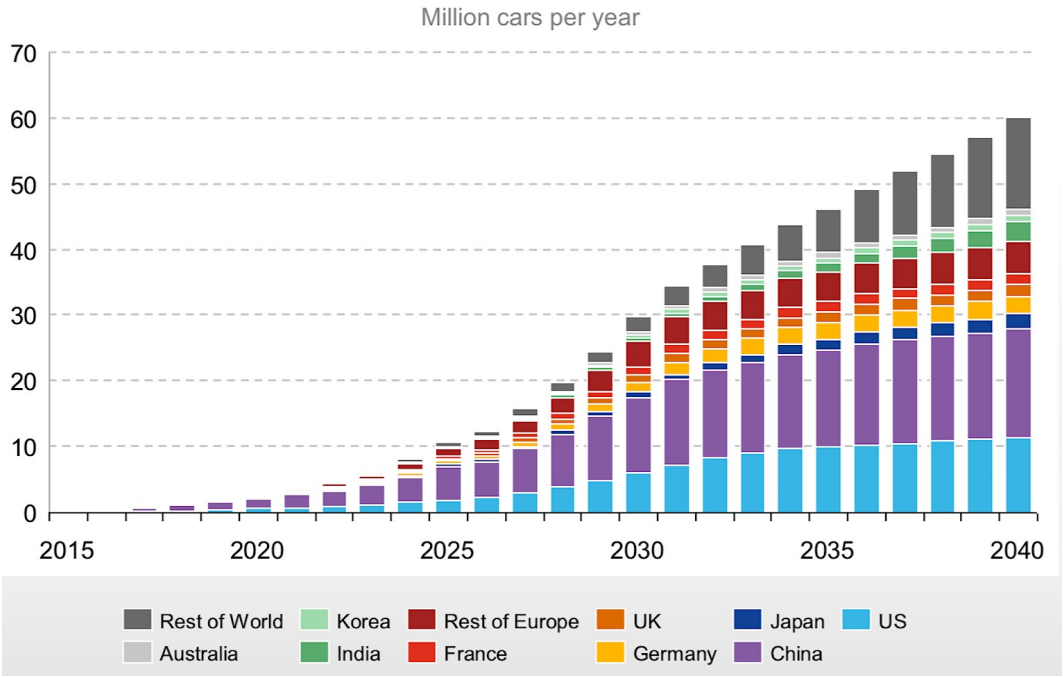
Therefore, the technological development associated with lower prices of lithium-ion batteries will overcome the current strongest barrier for the mass diffusion of electric vehicles, i.e. the price.

In fact, as demonstrated by empirical evidence, the electric mobility market is growing both globally and nationally.

As concerns the international scenario, Figure III.7 depicts the growth scenario of electric vehicles worlwide.

[29] The powertrain is the mechanism that transmits the drive from the engine of a vehicle to its axle.

Figure III.7 Growth scenario of electric vehicles worldwide



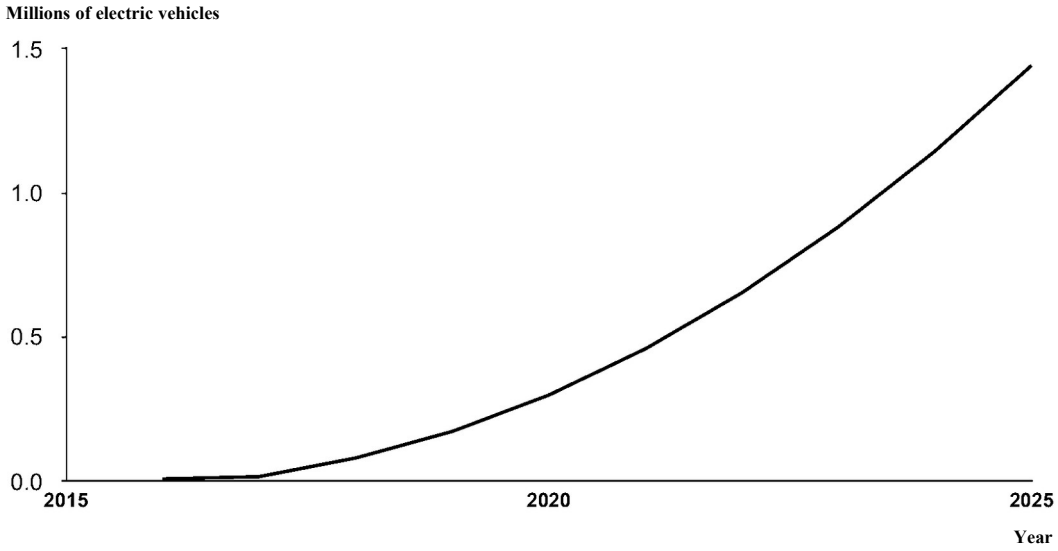
Source: Bloomberg (2018)

According to the report of Bloomberg (2018), the global electric vehicles market will have strong growth in the long term. As a result, the electric vehicles would account for 55% of new sales by 2040, while traditional vehicles will gradually exit the market. In detail, globally, China and the United States will represent a major market in the next decades, while, at the European level, Germany, the United Kingdom, and France will lead the market in the near future. Italy is not represented in the chart because it lags behind other European countries (such as Germany, UK, and France) in the diffusion of electric mobility. However, the electric vehicle

market in Italy is crucial for the business model of Enel X. Therefore, we will focus our analysis also, and above all, on the electric mobility market in Italy.

As concerns the Italian scenario, Figure III.8 depicts the growth scenario of electric vehicles in Italy.

Figure III.8 Growth scenario of electric vehicles in Italy



Source: Politecnico di Milano (2018)

As can be seen in Figure III.8, a recent study by PwC forecasts a steep rise of electric vehicles in Italy, with an increasing trend that would see the fleet of electric vehicles grow from the approximately 15 thousand currently on the road to about 0.5 million vehicles in 2025 in the base scenario or even 1.5 million in the most optimistic projecton (Enel, 2018). This trend will be supported by multiple drivers connected with the greater sustainability and economic advantages of electric vehicles. On the one hand, electric vehicles can reduce CO2 emissions by 72%, combined with

greater efficiency (i.e., three times as great) than traditional vehicles. On the other hand, as discussed above, electric vehicles will become increasingly price competitive, with the cost of batteries expected to fall over time, achieving cost parity between electric and traditional vehicle by 2024.

In conclusion, we can assume that the business model of Enel X will benefit in the long run from the growth, and further technological innovations, of the electric mobility industry. The widespread use of electric vehicles will need greater coverage of the recharging infrastructure. In this respect, Enel X has already planned to build 14 thousand recharging points on the Italian territory by 2022, thus trying to capture the value created by the diffusion of electric mobility.

II.3.5. The regulatory framework of electric mobility

The business model of Enel X also strongly depends on the regulatory framework of electric mobility. In fact, regulations[30] play a key role in determining the success or failure of a business model. Indeed, regulations can influence the business environment in which a company operates, acting as an enabler or obstacle to the growth and viability of a business model. Therefore, we have to take into account the role of regulations in the business model analysis of Enel X.

[30] Regulations are rules made by a government or other authority in order to control the way something is done or the way people behave, and are based on and meant to carry out a specific piece of legislation (e.g., the protection of the environment).

In this section we will thus focus on the impact, whether positive or negative, that the regulatory framework of electric mobility has on the business model of Enel X. For this purpose, we will consider the European regulation as well as the Italian one.

The most relevant regulatory references are the alternative fuels infrastructure directive (AFID) (European Union, 2014), the national infrastructural plan for charging electric-powered vehicles (PNIRE) (Ministero delle Infrastrutture e dei Trasporti, 2016), the appropriation bill 2019 (L.145/2018) (Gazzetta Ufficiale, 2018), and the clean mobility package (European Commission, 2018).

At the European level, the Directive [31] 2014/94/EU (AFID) establishes a common framework of measures for the deployment of alternative fuels infrastructure in the European Union in order to minimise dependence on oil and to mitigate the environmental impact of transport. The directive sets out minimum requirements for the building-up of alternative fuels infrastructure, including recharging points for electric vehicles, common technical specifications, and user information requirements for such recharging points to be implemented by means of the national policy framework of the Member States (Directive 2014/94/EU, art.1). Therefore, each Member State shall adopt a national policy framework for the development of the market as regards alternative fuels in the transport sector and the deployment of

[31] A directive is a legislative act that sets out a goal that all European Union countries must achieve by devising their own laws, while a regulation is a binding legislative act that must be applied in its entirety across the European Union.

the relevant infrastructure (Directive 2014/94/EU, art.3). Finally, Member States shall ensure, by means of their national policy framework, that an appropriate number of recharging points accessible to the public are put in place by 31 December 2020, in order to ensure that electric vehicles can circulate at least in urban/suburban agglomerations and other densely populated areas. The number of such recharging points shall be established taking into consideration, among other things, the number of electric vehicles estimated to be registered by the end of 2020 (Directive 2014/94/EU, art.4).

In detail, the directive delineates the following elements:

- Coverage of recharging points: the appropriate average number of recharging points should be equivalent to at least one recharging point per 10 cars;
- Connectors for electric vehicles: the connectors for electric vehicles included in this directive are the Type 2 (alternating current AC) and Combo 2 (direct current DC) connectors. However, this directive is not detrimental to Member States having already invested in the deployment of other standardised technologies for recharging points. Besides, other interfaces to charge electric vehicles could include several socket outlets or vehicle connectors as long as they allow multistandard recharging;
- Recharging interface technologies: current recharging interface technologies include cable connectors, but legislation should facilitate technological

innovation and take into account future standards for technology such as wireless charging and battery swapping;

- Intelligent metering systems: the recharging of electric vehicles at recharging points should make use of intelligent metering systems. In fact, intelligent metering systems ensure the stability of the electricity system by recharging batteries from the grid at times of low general electricity demand and, thus, low energy prices. Therefore, the use of intelligent metering systems optimises recharging, with benefits for the electricity system and consumers;
- Market conditions: the establishment and operation of recharging points for electric vehicles should be developed as a competitive market with open access to all parties interested in rolling-out or operating recharging infrastructure;
- Distribution system operators [32]: Member States shall ensure that distribution system operators cooperate on a non-discriminatory basis with any person establishing or operating recharging points accessible to the public;
- Publicly accessible recharging infrastructure: the main points to consider are the following:

[32] Distribution system operator means a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the distribution system in a given area and, where applicable, its interconnections with other systems and for ensuring the long term ability of the system to meet reasonable demands for the distribution of electricity or gas (Directive 2007/72/EC, art.2 n.6) (European Union, 2007).

- Member States should define an appropriate number of recharging points accessible to the public, as well as their specifications (i.e., normal or high power recharging points[33]);
- Member States shall ensure that operators of recharging points [34] accessible to the public are free to purchase electricity from any European Union electricity supplier (subject to the agreement of the electricity supplier) and to provide electric vehicle recharging services to customers on a contractual basis, including in the name and on behalf of other service providers;
- Recharging points accessible to the public shall provide the possibility for electric vehicle users to recharge without entering into a contract with the electricity supplier or operator concerned;
- Member States shall ensure that the prices charged by the operators of recharging points accessible to the public are reasonable, easily and clearly comparable, transparent and non-discriminatory.

• Not publicly accessible recharging points: the distribution system operators should cooperate on a non-discriminatory basis with any other owners or operators of recharging points, in particular providing them with the information needed for the efficient access to and use of the system;

[33] Normal power recharging point means a recharging point that allows for a transfer of electricity to an electric vehicle with a power less than or equal to 22 kW, while high power recharging point means a recharging point that allows for a transfer of electricity to an electric vehicle with a power of more than 22 kW.
[34] The recharging point operator is the owner of the charging station for the recharging of electric vehicles.

- Intelligent transport system: information concerning the availability of recharging points should be included in traffic and travel information services as part for the Union-wide mobility;
- User information: after 18 November 2016, Member States shall ensure that relevant, consistent, and clear information is made available for electric-powered vehicles in motor vehicles manuals, at recharging points and in motor vehicles dealerships.

In addition to this directive, in 2018, the European Commission has completed the issuance of the so-called "Clean Mobility Package". The package represents a decisive step forward by the European Commission in the implementation of the Paris Agreement[35] commitments, namely the binding domestic reduction of CO2 emissions of at least 40% until 2030. The package includes a number of legislative proposals aimed at reducing CO2 emissions and air pollution, supporting the development of zero and low emission vehicles, and the creation of a European battery production supply chain. In detail, the package includes the following legislative proposals:

- The reduction of CO2 emissions: this proposal sets CO2 emission standards for 2025 and 2030 of new cars and light and heavy vehicles in order to help manufacturers to accept innovation and supply low-emission vehicles to the

[35] The Paris Agreements is an agreement signed in 2016 by 195 States within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions mitigation, adaptation, and finance.

market. In particular, it intends a 15 % reduction of CO2 emission by 2025 and a reduction of 37.5% for new cars and 31% for new light vehicles by 2030;

- The promotion of clean mobility: this proposal provides a clear definition of clean vehicle, based on combined pollutant and CO2 emission targets. Moreover, the "Clean Vehicles Directive" [36] is aimed at promoting clean mobility solutions in public procurement tenders through a system of purchasing for Member States, thereby providing a strong stimulus to demand and to the further diffusion of clean mobility solutions;
- The creation of a European battery production supply chain: this proposal is aimed at supporting the development of a European battery production and the creation of the enabling regulatory framework (e.g., CO2 vehicle standards), so that vehicles, other mobility solutions and their components will be invented and produced in the EU.

At the national level, the law of 7 August 2012, art. 17 septies, paragraph 1, better known as national infrastructural plan for recharging electric-powered vehicles (PNIRE)[37], is a set of guidelines promoted by the Ministry of Infrastructure and Transport aimed at guiding the development of electric mobility in Italy.

The national infrastructural plan for recharging electric-powered vehicles takes up article 3 of the Directive 2014/94/EU, with which Member States should define the

[36] Revised "Clean Vehicles Directive" (Directive 2009/33/EC).
[37] Piano Nazionale Infrastrutturale per la Ricarica dei veicoli alimentati ad energia Elettrica (PNIRE).

national strategic frameworks for the development of alternative fuels and their infrastructure. The plan is aimed at the creation of infrastructure networks for the recharging of electric-powered vehicles. In particular, the plan sets out guidelines to ensure the homogeneous development of the electric-powered vehicle recharging service in the country.

In summary, without going into too much detail of all the measures, the plan encompasses:

- the establishment of a vehicle recharging service, starting from urban areas, applicable in the private and public transport sector and compliant with the services counterparts of the European Union countries in order to ensure its international interoperability;
- the introduction of management procedures of the recharging service based on the peculiarities and potential of the electronic meter infrastructure, with a focus on the recharging costs for the customers (to be identified univocally); the provision of a differentiated tariff system; and the regulation of the timing and ways of recharging, combining the needs of customers with the optimization of the electricity network availability;
- the introduction of facilitations for the owners and operators of fuel distribution facilities, in order to modernize them through the construction of recharging infrastructure for electric-powered vehicles;

- the implementation of integrated programmes to promote technological adaptation of existing buildings;
- the promotion of technological research aimed at the creation of infrastructure networks for the recharging of electric-powered vehicles.

Moreover, at the national level, the appropriation bill 2019 (L. 145/2018) introduced the so-called "ecobonus for sustainable mobility", that consists of two distinct incentives aimed at encouraging the switch to electric or hybrid vehicles. In detail, the "ecobonus" includes incentives of up to €6000 for the purchase of M1[38] vehicles with CO2 emissions of less than or equal to 20 g/km, up to €2500 for the purchase of M1 vehicles with CO2 emissions of less than or equal to 70 g/km but higher than 20 g/km, and up to the 30% of the purchase price (maximum €3000) for the purchase of L[39] vehicles.

The "ecobonus", for both vehicles categories, is paid directly by the car dealership to the buyer by discount on the purchase price (maximum of €50000) of the electric vehicles. The car dealership is refunded by the manufacturers or importers of the vehicles, which in turn recover the sum through a tax credit.

In summary, the regulatory framework of electric mobility is already defined and clear, both at European and national level. On the one hand, it defines how

[38] M category vehicles are motor vehicles designed and built to transport people having at least four wheels. In detail, M1 category vehicles are vehicles intended to transport people, with a maximum of eight seats in addition to the driver's seat.
[39] L category vehicles are two, three, and four-wheeled mopeds and motorcycles.

recharging stations are to be built and managed and how the recharging service is to be offered to the public, enabling the business model of charge point operators and mobility service providers (as Enel X). On the other hand, it sets out the guidelines aimed at promoting the development of the electric mobility sector and boosting the demand for electric vehicles through monetary incentives (e.g. "ecobonus"). In fact, since the recharging service infrastructure and the electric mobility market are strongly interrelated, a sustained growth in the demand for electric vehicles will have an impact on the diffusion of the recharging service infrastructure, influencing in turn the long-term viability of the business model of Enel X.

To conclude, based on the current regulatory framework and legislative proposals for the future, we can state that the business model of Enel X benefits from the regulatory environment in which it operates.

CONCLUSIONS

The aim of this thesis was to analyse the business model for electric mobility of Enel X. In order to accomplish this research purpose, the analysis was carried out based on the most relevant literary references as well as information from corporate documents and industry reports. In detail, the addressed research questions were about the functioning of the company's business model and its sustainability and viability in the long term.

The results of the research are quite interesting. As for the first research question, i.e. the functioning of the business model, it has emerged that Enel X provides a public recharging service for electric mobility by employing a so-called "integrated business model", in which the company has the control of and performs all the activities of the related value chain. This characteristic of the company's business model may represent a source of long-lasting competitive advantage and prevent the copycat behaviour of rival firms, as competitors and new entrants may not be able to perform all the activities of the value chain (e.g., Enel X, acting as a technology provider, already owns the intellectual properties for the recharging stations). As for the second research question, i.e. the sustainability and viability of the business model in the long run, the analysis focused on the interrelation between the company's business model and the electric mobility industry, particularly with regard to the technological evolution and diffusion as well as regulatory aspects of

the latter. Indeed, the business model is influenced by both the technological evolution and regulations of the electric mobility industry. On the one hand, the technological development will trigger the widespread use of electric vehicles as they will become more affordable and guarantee all daily travel, leading thus to the need of a widely diffused recharging infrastructure. On the other hand, the current regulatory framework is aimed at encouraging the demand for electric vehicles (e.g., "ecobonus") and promoting the spread of the recharging infrastructure. As a result, it can be fairly assumed that the sustainability and viability of the business model will benefit in the long term from the future trend of the electric mobility industry.

In conclusion, in spite of the analytical efforts riveted to the appraisal of the essential success factors of the business model, there is so far only rudimental knowledge in the literature for determining the "quality" of a business model. In fact, approaches for the measurement and explication of the "quality" of a business model have nearly failed completely (Wirtz et al., 2016). Therefore, a future research agenda should be aimed at filling the research gap with regard to the practical applicability and measurability of the business model concept in management practice.

REFERENCES

Retrieved from https://www.ebsco.com

Retrieved from Merriam-Webster:

https://www.merriam-webster.com/dictionary/information%20technology

Abrahamson, E., & Fairchild, G. (1999). Management fashion: lifecycles, triggers, and collective learning processes. Administrative Science Quarterly, 44(4), 708-740.

Afuah, A. (2004). Business models: a strategic management approach. New York: McGraw-Hill/Irwin.

Afuah, A., & Tucci, C. (2003). Internet business models and strategies. New York: McGraw-Hill/Irwin.

Albadi, M. H., & El-Saadany, E. F. (2008). A summary of demand response in electricity markets. Electric Power Systems Research, 78.

Al-Debei, M., El-Haddadeh, R., & Avison, D. (2008). Definining the business model in the new world of digital business. Americas Conference on Information Systems.

Allenby, B. R. (2000). Implementing industrial ecology: the AT&T matrix system. Interfaces, 30(3), 42-54.

Ambrosini, V., & Bowman, C. (2009). What are dynamic capabilities and are they a useful construct in strategic management? International Journal of Management Reviews, 11(1), 29-49.

Amit, R., & Zott, C. (2001). Value creation in e-business. Strategic Management Journal, 22(6-7), 493-520.

Andersen, M. S. (2007). An introductory note on the environmental economics of the circular economy. Sustainability Science, 2(1), 133-140.

Applegate, L. M. (2001). Emerging e-business models: lessons from the field. Boston: Harvard Business School.

Ayres, R. U. (1989). Industrial metabolism and global change. International Social Science Journal, 41, 363-373.

Ayres, R. U., & Knesse, A. V. (1969). Production, consumption, and externalities. The American Economic Review, 59(3), 282-297.

Ayres, R., Ferrer, G., & Van Leynseele, T. (1997). Eco-efficiency, asset recovery and remanufacturing . European Management Journal, 15(5), 557-574.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Baumgartner, R. J., & Zielowski, C. (2007). Analyzing zero emission strategies regarding impact on organizational culture and contribution to sustainable development. Journal of Cleaner Production, 15(13), 1321-1327.

Bellman, R., Clark, C., & al., e. (1957). On the construction of a multi-stage, multi-person business game. Rand Corporation.

Benyus, J. M. (1997). Biomimicry. New York, NY: William Morrow.

Berkel, R., Willems, E., & Lafleur, M. (1997). The relationship between cleaner production and industrial ecology. Journal of Industrial Ecology, 1(1), 51-66.

Bloomberg New Energy Finance. (2018). Electric Vehicle Outlook 2018.

Blue Economy. (2016). Webisite. Principles. Retrieved from http:// www.blueeconomy.eu/page/the-principles-of-blue-economy/.

Bolt, K. M. (2005, June 15). Starbucks adjusts its formula in China.

Boulding, K. E. (1966). The economics of the coming spaceship Earth. Baltimore: Johns Hopkins Univerisity Press.

Carson, R. (1962). Silent spring. Boston: Houghton Mifflin.

Casadesus-Masanell, R., & Ricart, J. (2010). From strategy to business models and onto tactics. Long Range Planning, 43(2-3), 195-215.

Casadesus-Masanell, R., & Ricart, J. E. (2011). How to design a winning business model. Harvard Business Review, 89(1/2), 100-107.

Chesbrough, H. (2007). Business model innovation: it's not just technology anymore. Strategy & Leadership, 35(6), 12-17.

Chopra, S., & Meindl, P. (2010). Supply chain management: strategy, planning and operation. Pearson Prentice Hall Inc.

Cicchetti, C., Fisher, A., & Smith, V. (1973). Economic models and planning outdoor recreation. Operations Research, 21(5), 1104-1113.

Cole, R. J. (2012). Transitioning from green to regenerative design. Building Research & Information, 40(1), 39-53.

Costanza, R., & Daly, H. E. (1992). Natural capital and sustainable development. Conservation Biology, 6(1), 37-46.

DaSilva, C., & Trkman, P. (2014). Business model: what it is and what it is not. Long Range Planning, 47, 379-389.

Daugherty, P. J., Myers, M. B., & Richey, R. G. (2002). Information support for reverse logistics: the influence of relationship commitment. Journal of Business Logistics, 23(1), 85-106.

De Brito, M. P., & Dekker, R. (2004). A framework for reverse logistics. In Reverse logistics (pp. 3-27). Berlin, Germany: Springer Berlin Heidelberg.

De Man, R., & Friege, H. (n.d.). Circular economy: european policy on shaky ground. Waste Management & Research, 34(2), 93-95.

De Pauw, I., Karana, E., & Kandachar, P. (2013). Cradle to cradle in product development: a case study of closed-loop design. In Re-engineering manufacturing for sustainability (pp. Re-engineering manufacturing for sustainability). Singapore: Springer.

EBSCO Industries, Inc. Retrieved from https://www.ebsco.com

Ellen MacArthur Foundation. Retrieved from Ellen MacArthur Foundation: https://www.ellenmacarthurfoundation.org

Ellen MacArthur Foundation. (2016). Circularity indicators. Retrieved from Ellen MacArthur Foundation:

https://www.ellenmacarthurfoundation.org/assets/downloads/insight/Circularity-Indicators_Project-Overview_May2015.pdf

Ellen MacArthur Foundation. (2016). Circularity indicators. Retrieved from https://www.ellenmacarthurfoundation.org/programmes/insight/circularity-indicators

Enel. (2018). Enel. Retrieved from https://www.enel.com/content/dam/enel-com/governance_pdf/reports/bilanci-annuali/2018/bilancio-di-sostenibilita-2018.pdf

Enel. (2018). Enel. Retrieved from https://www.enel.com/content/dam/enel-com/governance_pdf/reports/bilanci-annuali/2018/relazione-finanziaria-annuale-2018.pdf

Enel. (2018). Enel. Retrieved from https://www.enel.com/content/dam/enel-common/press/en/2018-jan/Enel%20PwC%20ENG.pdf

Enel. (2018). Enel. Retrieved from https://www.enel.com/content/dam/enel-common/press/en/2018-jan/Enel%20PwC%20ENG.pdf

Enel X. Enel X. Retrieved from https://www.enelx.com/en/questions-and-answers/eindustry/what-is-demand-side-management

Erkman, S. (1997). Industrial ecology: an historical view. Journal of Cleaner Production, 5, 1-10.

Esposito, M., Tse, T., & Soufani, K. (2017a). Is the circular economy a new fast-expanding market? Thunderbird International Business Review, 59(1), 9-14.

Europe 2020 strategy. Retrieved from European Commission: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/framework/europe-2020-strategy_en

European Commission. Retrieved from European Commission: https://ec.europa.eu/environment/resource_efficiency/index_en.htm

European Commission. (2015). Circular economy package: questions & answers: MEMO/15/6204. Retrieved from http://europa.eu/rapid/ press-release_MEMO-15-6204_en.htm

European Commission. (2018). European Commission. Retrieved from https://europa.eu/rapid/press-release_IP-18-3708_en.htm

European Union (EU). (2008). Official journal of EU, L312, 19.11.2008. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives. Retrieved from https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:312:0003:0030:en:PDF

European Union. (2007). EUR-Lex. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32007L0072&from=EN

European Union. (2014). EUR-Lex home. Retrieved from https://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:32014L0094&from=en

Extended producer responsibility-OECD. Retrieved from OECD: https://www.oecd.org/env/toolsevaluation/extendedproducerresponsibility.htm

Feldman, K., & Sandborn, P. (2007). Integrating technology obsolescence considerations into product design planning. Proceedings of the ASME 2007 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, 981-988.

Fleischmann, M., Bloemhof-Ruwaard, J. M., Dekker, R., Van der Laan, E., Van der Laan, J. A., & Van Wassenhove, L. N. (1997). Quantitative models for reverse logistics: a review. European Journal of Operational Research, 103(1), 1-17.

Frosch, R. A., & Gallopoulus, N. E. (1989). Strategies for manufacturing. Scientific American, 261(3), 144-152.

Gazzetta Ufficiale della Repubblica Italiana. (2018). Retrieved from https://www.gazzettaufficiale.it/eli/gu/2018/12/31/302/so/62/sg/pdf

Geisendorf, S., & Pietrulla, F. (2017). The circular economy and circular economic concepts-a literature analysis and redefinition. Thunderbird International Business Review, 60(3), 771-782.

Geissdoerfer, M., Savaget, P., Bocken, N. M., & Hultink, E. J. (2017). The circular economy-a new sustainability paradigm? Journal of Cleaner Production, 143, 757-768.

Geng, Y., & Doberstein, B. (2008). Developing the circular economy in China: challenges and opportunities for achieving'leapfrog development'. International Journal of Sustainable Development & World Ecology, 15, 231-239.

Geng, Y., Fu, J., Sarkis, J., & Xue, B. (2012). Towards a national circular economy indicator system in China: an evaluation and critical analysis. Journal of Cleaner Production, 23(1), 216-224.

George, D. A., Lin, B. C., & Chen, Y. (2015). A circular economy model of economic growth. Environmental Modelling & Software, 73, 60-63.

George, G., & Bock, A. (2011). The business model in practice and its implications for entrepreneurship reserach. Entrepreneurship Theory and Practice, 35(1), 83-111.

Geyer, R., & Jackson, T. (2004). Supply loops and their constraints: the industrial ecology of recycling and reuse. California Management Review, 46(2), 55-73.

Ghaziani, A., & Ventresca, M. (2005). Keywords and cultural change: frame analysis of business model publick talk. Sociological Forum, 20(4), 523-559.

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, 114, 11-32.

Govindan, K., Soleimani, H., & Kannan, D. (2015). Reverse logistics and closed-loop supply chain: a comprehensive review to explore the future. European Journal of Operational Reserach, 240(3), 603-626.

Gregson, N., Crang, M., Fuller, S., & Holmes, H. (2015). Interrogating the circular economy: the moral economy of resource recovery in the EU. Economy and Society, 44, 218-243.

Haas, W., Krausmann, F., Wiedenhofer, D., & Heinz, M. (2015). How circular is the global economy?: an assessment of material flows, waste production, and recycling in the european union and the world in 2005. Journal of Industrial Ecology, 19, 765-777.

Hamel, G. (2000). Leading the Revolution. Harvard Business School Press, Boston.

Hawken, P., Lovins, A. B., & Lovins, L. H. (2013). Natural capitalism: the next industrial revolution. London, England: Routledge.

Hedman, J., & Kalling, T. (2003). The business model concept: theoretical underpinnings and empirical illustrations. European Journal of Information Systems, 12(1), 49-59.

Huang, Y., Bird, R. N., & Heidrich, O. (2007). A review of the use of recycled solid waste materials in asphalt pavements. Resources, Conservation and Recycling, 52(1), 58-73.

Huppes, G., & Ishikawa, M. (2005). Eco-efficiency and its terminology. Journal of Industrial Ecology, 9(4), 43-46.

IBM. (2007). Paths to success: Three ways to innovate your business model.

Idowu, S., Capaldi, N., Zu, L., & Das Gupta, A. (2013). Encyclopedia of Corporate Social Responsibility. Berlin, Heidelberg: Springer.

Johnson , M. R., & McCarthy, I. P. (2014). Product recovery decisions within the context of extended producer responsibility. Journal of Engineering and Technology Management, 34, 9-28.

Johnson, M., Christensen, C., & Kagermann, H. (2008). Reinventing your business model. Harvard Business Review, 86(12), 50-59.

Jones, G. M. (1960). Educators, electrons and business models: a problem in synthesis. Accounting Review (35), 619-626.

Kim, K., Song, I., Kim, J., & Jeong, B. (2006). Supply planning model for remanufacturing system in reverse logistics environment. Computers & Industrial Engineering, 51, 279-287.

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: an analysis of 114 definitions. Resources, Convservation and Recycling, 127, 221-232.

Konczal, E. (1975). Models are for managers, not mathematicians. Journal of Systems Management, 26(1), 12-15.

Krikke, H., Le Blanc, I., & Van de Velde, S. (2004). Product modularity and the design of closed-loop supply chains. California Management Review, 46(2), 23-29.

Kumar, S., & Putnam, V. (2008). Cradle to cradle: reverse logistics strategies and opportunities across three industries sectors. International Journal of Production Economics, 115, 305-315.

Lenzen, M., Murray, J., Sack, F., & Wiedmann, T. (2007). Shared producer and consumer responsibility-theory and practice. Ecological Economics, 61(1), 27-42.

Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. Journal of Cleaner Production, 115, 36-51.

Linder, J., & Cantrell, S. (n.d.). Changing business models: surveying the landscape. Accenture Institute for Strategic Change. Cambridge.

Lindman, M. (2007). Remarks on the quality of the construction of business concepts. European Business Review, 19(3), 196-215.

Linton, J. D., & Jayaraman, V. (2005). A conceptual framework for product life extension. International Journal of Production Research, 43, 1807-1829.

Lippman, S. A., & Rumelt, R. P. (1982). Uncertain imitability: an analysis of interfirm differences in efficiency under competition. The Bell Journal of Economics, 13(2), 418-438.

Lovins, L. H. (2008). Rethinking production. In State of the world 2008: innovations for a sustainable society (pp. 32-44). New York: W.W.Norton.

Lyle, J. T. (1996). Regenerative design for sustainable development. New York, NY: Wiley.

Ma, S., Wen, Z. Z., Chen, J., & Wen, Z. Z. (2014). Mode of circular economy in China's iron and steel industry: a case study in Wu'an city. Journal of Cleaner Production, 64, 505-512.

Magretta, J. (2002). Why business models matter. Harvard Business Review, 80(5), 86-93.

McDonough, W., & Braungart, M. (2002). Cradle to cradle: remaking the way we make things. New York: North Point Press.

McDonough, W., Braungart, M., Anastas, P. T., & Zimmerman, J. B. (2003). Applying the principles of green engineering to cradle-to-cradle design. Environmental Science & Design, 37(23), 434A-441A.

McIvor, R. (2009). How the transaction cost and resource-based theories of the firm inform outsourcing evaluation. Journal of Operations Management, 27(1), 45-63.

McKinsey & Company. (2015, September). Europe's circular economy opportunity. Retrieved from http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/ europes-circular-economy-opportunity

Ministero delle Infrastrutture e dei Trasporti. (2016). Governo Italiano-Presidenza del Consiglio dei Ministri. Retrieved from http://www.governo.it/sites/governo.it/files/PNire.pdf

Mont, O. K. (2002). Clarifying the concept of product-service system. Journal of Cleaner Production, 10, 237-245.

Moriguchi, Y. (2007). Material flow indicators to measure progress toward a sound material-cycle society. Journal of Material Cycles and Waste Management, 9(2), 112-120.

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. Journal of Business Research, 58(6), 726-735.

Ness, D. (2008). Sustainable urban infrastructure in China: towards a factor 10 improvement in resource productivity through integrated infrastructure systems. International Journal of Sustainable Development & World Ecology, 15, 288-301.

Ormazabal, M., Prieto-Sandoval, V., Jaca, C., & Santos, J. (2016). An overview of the circular economy among smes in the basque country : a multiple case study. Journal of Industrial Engineering and Management, 9(5), 1047-1058.

Osterwalder, A., Pigneur, Y., & Tucci, C. (2005). Clarifying business models: origins, present and future of the concept. Communications of the Association for Information Systems, 16, 1-25.

Park, J., Sarkis, J., & Wu, Z. (2010). Creating integrated business and environmental value within the context of China's circular economy and ecological modernization. Journal of Cleaner Production, 18, 1492-1499.

Pauli, G. A. (2010). The blue economy: 10 years, 100 innovations, 100 million jobs. Taos, NM: Paradigm.

Pearce, D. W., & Turner, R. K. (1989). Economics of natural resources and the environment. Baltimore: Johns Hopkins University Press.

Peters, G. P., Weber, C. L., Guan, D., & Hubacek, K. (2007). China's growing CO(2) emissions-a race between increasing consumption and efficiency gains. Environmental Science & Technology, 41, 5939-5944.

Planing, P. (2015). Business model innovation in a circular economy: reasons for non-acceptance of circular business models. Open Journal of Business Model Innovation (in press).

Ploesser, K., Peleg, M., Soffer, P., Rosemann, M., & Recker, J. C. (2009). Learning from context to improve business processes. BPTrends, 6(1), 1-7.

Politecnico di Milano. (2018). E-mobility report 2018 - le opportunità e le sfide per lo sviluppo della mobilità elettrica in Italia.

Porter, M. E. (2001). Strategy and the Internet. Harvard Business Review. 79(3), 63-78.

Preston, F. (2012). A global redesign? shaping the circular economy. Energy, Environment and Resource Governance, 2, 1-20.

Prieto-Sandoval, V., Jaca, C., & Ormazabal, M. (2018). Towards a consensus on the circular economy. Journal of Cleaner Production, 179, 605-615.

Product Life. (2016). The performance economy. Retrieved from http:// www.product-life.org/en/major-publications/performance-economy

PwC. (2018). Pwc. Retrieved from https://www.pwc.com/gx/en/industries/automotive/assets/pwc-five-trends-transforming-the-automotive-industry.pdf

Ravi, V., Shankar, R., & Tiwari, M. K. (2005). Analyzing alternatives in reverse logistics for end-of-life computers: ANP and balanced score-card approach. Computers & Industrial Engineering, 48, 327-356.

Reap, J., Baumeister, D., & Bras, B. (2005). Holism, biomimicry and sustainable engineering. Proceedings of the ASME 2005 International Mechanical Engineering Congress and Exposition, 423-431.

Recker, J., Rosemann, M., Indulska, M., & Green, P. (2009). Business process modeling-a comparative analysis. Journal of the Association for Information Systems, 10(4), 333-363.

Rodale, R. (1983). Breaking new ground: the search for a sustainable agriculture. Futurist, 1, 15-20.

Rogers, D. S., & Tibben Lembke, R. (2001). An examination of reverse logistics practices. Journal of Business Logistics, 22(2), 129-148.

Rogers, D. S., & Tibben-Lembke, R. S. (1998). Going backwards: reverse logistics trends and practices. Center for Logistics Management, University of Nevada, Reno: Reverse Logistics Executive Council. 1998.

Rumelt, R. (2011). Good strategy/bad strategy: the difference and why it matters. New York: Crown Business.

Schön, O. (2012). Business model modularity-a way to gain strategic flexibility? Controlling & Management, 56(2), 73-78.

Schumpeter, J. (1934). The theory of economic development. New York: Harvard University Press.

Shirky, C. (2008). Here comes everybody: the power of organizing without organizations. New York: Penguin.

Stahel, W. (1994). The utilization-focused service economy: resource efficiency and product-life extension. In D. J. Richards, & B. R. Allenby, The greening of industrial ecosystems (pp. 178-190). Washington, DC: National Academies Press.

Stahel, W. R. (2013). Policy for material efficiency-sustainable taxation as a departure from the throwaway society. Philosophical Transactions of The Royal Society A, 371(1986), 1-19.

Stahel, W. R. (2016). Circular economy. Nature, 6-9.

Stahel, W. R., & Reday-Mulvey, G. (1981). Jobs for tomorrow: the potential for substituting manpower for energy. New York: Vantage Press.

Teece, D. (2009). Dynamic capabilities and strategic management: organizing for innovation and growth. New York: Oxford University Press.

Teece, D. (2010). Business models, business strategy and innovation. Long Range Planning, 43(2-3), 172-194.

Teece, D. J. (2014b). A dynamic capabilities-based entrepreneurial theory of the multinational enterprise. J. Int. Bus. Stud., 45(1), 8-37.

Teece, D. J. (2016). Dynamic capabilities and entrepreneurial management in large organizations: toward a theory of the (entrepreneurial firm) firm. Eur. Econ. Rev., 86, 202-216.

Teece, D. J. (2018). Business models and dynamic capabilities. Long Range Planning, 51, 40-49.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533.

Thornton, J., & Marche, S. (2003). Sorting through the dot bomb rubble: how did the high-profile e-tailers fail? International Journal of Information Management, 23, 121-138.

Timmers, P. (1998). Business models for electronic markets. Electronic markets, 8(2), 3-8.

Toffel, M. W. (2004). Strategic Management of product recovery. California Management Review, 46(2), 120-141.

Treacy, M., & Wiersema, F. (1996). The discipline of market leaders. Boston: Addison-Wesley.

UNEP. (2011). Towards a green economy: pathways to sustainable development and poverty eradication, sustainable development.

United Nations. (2014). United Nations. Retrieved from https://sustainabledevelopment.un.org/content/documents/4538pressowg13.pdf

US Department of Transportation. (2011). National Household Travel Survey. Retrieved from https://nhts.ornl.gov/2009/pub/stt.pdf

Valacich, J., & Schneider, C. (2010). Information systems today: managing the digital world. London: Pearson.

Visser , W. (2010). The age of responsibility: CSR 2.0 and the new DNA of business. Journal of Business Systems, Governance and Ethics, 5(3), 1-17.

Voelpel, S., Leibold, M., Tekie, E., & von Krogh, G. (2005). Escaping the red queen effect in competitive strategy: sense-testing business models. European Management Journal, 23(1), 37-49.

Von Bertalanffy, L. (1968). General systems theory. New York: Braziller.

What is an ecocity?. Retrieved from Ecocity Builders: https://ecocitybuilders.org/what-is-an-ecocity/

Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). Business models: origin, development and future research perspectives. Long Range Planning, 49(1), 36-54.

Wollscheid, C. (2012). Rise and burst of the dotcom bubble: caused, characteristics, examples. Grin.

Wysokinska, Z. (2016). The "new" environmental policy of the European Union: a path to development of a circular economy and mitigation of the negative effects of climate change. Comparative Economic Research, 19(2), 57-73.

Xue, B., Chen, X. P., Geng, Y., Guo, X. J., Lu, C. Y., Zhang, Z. L., & Lu, C. Y. (2010). Survey of officials' awareness on circular economy development in China: based on municipal and county level. Resources, Conservation and Recycling, 54(12), 1296-1302.

Yang, S., & Feng, N. (2008). Case study of industrial symbiosis: nanning sugar Co., ltd. in China. Resources, Conservation and Recycling, 52(5), 813-820.

Yuan, Z., Bi, J., & Moriguichi, Y. (2006). The circular economy: a new development strategy in China. Journal of Industrial Ecology, 10, 4-8.