



Sharing Economy and Big Data Analytics

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Sharing Economy and Big Data Analytics

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Preface

*It seems that perfection is achieved not when there is nothing more to add,
but when there's nothing left to take away.*

Antoine de Saint-Exupéry

Welcome to this book!

By reading the table of contents, you have probably noticed the diversity of topics we are about to discuss. The purpose of the *Sharing Economy and Big Data Analytics*, as the title suggests, is to provide a good reference source in these two fields, which have emerged in the digital context. These two fields are so vast that a book ten times larger could not cover everything.

From a theoretical and practical point of view, this book adds new knowledge and expands the growing body of literature in the field of the Big Data-based sharing economy. It examines why the new data analysis techniques are needed for sharing economy companies.

These reasons are not only related to the implementation of advanced technologies, enabling the capture and the analysis of large amounts of available data, but also to the extraction of value to better guide, optimize the decision-making process and operationalize the company's various activities.

These questions will be primarily based on the following points:

- How did the different players give meaning to the concept of sharing? Or, in another way, how have they been able to develop their business models in a way that competes and/or coexists with existing models?

– How is the value captured, created and delivered, and how is this value co-created in regard to the interaction of multi-purpose players in this sharing context? Or, how does the ecosystem of sharing logic work, and what are the impacts, as well as the economic, social and environmental challenges?

– What is the role of Big Data and the set of data analysis techniques and algorithms in value creation in an economy based on sharing? How do these algorithms and new analytical techniques affect the ecosystem of the sharing economy?

The objective is to show the power of Big Data analytics and explain why it is so important for the sharing economy. Especially if we notice, thanks to the exploration carried out on the whole literature, that a few studies have simultaneously addressed these two fields. This is the full potential of this book, which will serve as a reference for readers in order to understand the role of Big Data analytics as a critical success factor for sharing economy companies.

This book therefore discusses the why and the how, in order to help the reader understand these two parallel universes. For each chapter, we have chosen a different aspect which we find interesting, while hoping that these aspects will serve as points of entry into these two exciting universes.

Soraya SEDKAOUI
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Introduction

*Knowledge is acquired through experience,
everything else is information.*

Albert Einstein

The discussion regarding sharing is very eloquent, it evokes a feeling of kindness and solidarity in each of us. It is used to express a desire to share a part of what we have with others: we can share a meal, an apartment or a car.

But can we share everything?

“I ask nothing more than to share my sorrows and joy.¹”

Sharing is an interface between individuals, it concerns both concrete and abstract things. In this way, we can share our pain, our joy, our love and even our life. Sharing helps to alleviate the suffering of people in need who are living in poverty. When we give part of what we have, we eradicate the selfishness that lies dormant within us and awaken hope of our human values in others.

The notion of sharing is not a human invention, but a reality that has accompanied man since the dawn of time. It is the result of needing to live in a community and strengthen social ties; because living in a society where sharing prevails strengthens security and trust between individuals.

Following the economic crises that shook the world economy after the Industrial Revolution, we became aware of the multi-dimensional nature of these crises

1 Jean-Louis-Auguste Commerson.

(economic, social, environmental) and the value of reviewing the business models adopted so far.

“Sharing” has thus become the emblem of the new business model that we tend to call “the sharing economy”. It is defined as an activity to procure, provide or share goods or services via digital technology or, more precisely, “digital platforms”.

The sharing economy is part of the sustainable development perspective, the purpose of which is to rationalize the exploitation of underutilized resources or assets.

This business model owes its reputation to Internet performance: digital platforms, even if individuals have been engaged in sharing activities for thousands of years.

Over time, digital platforms have become more efficient and now govern a wide range of business transactions: C2C, C2B and also B2B.

But what about the spirit of sharing in the sharing economy?

Criticisms about the sharing economy focus on the lexical amalgam encountered in the activities of start-ups in this field. Thus, when a company like Airbnb is considered as a highly prized example of the sharing economy by the majority of individuals, where is the principle of sharing in the rental or paid reservation of an apartment by this platform?

There is controversy over the concept of the sharing economy, because other concepts are related: the collaborative economy, the platform economy, the demand economy, the independent economy, the gig economy, etc.

To avoid this confusion, we can say that the sharing economy is about the use of underutilized resources, which are not free of charge, because the shared products or services can be both paid and free.

In this context, the spirit of sharing or collaboration is a metaphor that satisfies the beliefs of a new standard of economic thought that is at odds with traditional models.

Even if this displeases some people, we will improperly call it the “sharing economy” and the “collaborative economy”.

I.1. Why this book?

Our most beautiful adventures are our thoughts.

Victor Cherbuliez, 1864

This is a relevant question that we had to ask ourselves before embarking on this “delightful” adventure!

On the one hand, the idea for this book was born from our personal beliefs. As researchers, it is our responsibility to question and analyze the phenomena that challenge us.

On the other hand, and without a doubt, our training courses have a lot to do with the choice of this theme. This is the meeting of two disciplines: environmental economics and data sciences. Therefore, we initially started from the interest of these two disciplines.

The environmental economy has undergone a remarkable expansion over the past forty years, coinciding with the rise of ecological awareness. The environmental crisis is the consequence of the natural environment degradation and the well-being of the society.

Among the solutions contemplated to remedy this situation, the shared economy stands as a stronghold against the waste of goods and services, and against the overexploitation of natural resources. It is a new business model that reintegrates human values into the business world.

This economy revives the spirit of sharing in economic transactions, even in those that are monetized. Monetary compensation remains insignificant when compared to the feeling of satisfaction of having participated in the sustainability of the community.

The genius of man is his ability to adapt to new situations by creating the means to adapt to new deals. In the sharing economy context, it is the advent of digital technology, illustrated by research in Big Data analytics which gives rise to digital platforms, that has contributed to the realization of this new model.

Thus, Big Data analytics has become an essential instrument for management in all disciplines, including economics. It helps to ensure efficiency in decision-making at both macroeconomic or microeconomic levels. Through this book, we have tried to demonstrate the role that Big Data analytics can play in the evolution of the sharing economy.

I.2. The scope of this book

*Having knowledge without sharing it,
is to put oneself at a level of the one who has no ideas.*

Thucydide (5th Century BC)

Through this book, we wanted to be forward-thinking by proposing a topical theme of great socio-economic relevance. It is dedicated to researchers in both disciplines: economics and data science.

It is also intended for business leaders, managers and investors who want to engage in the sharing economy activities. It also concerns students, or simply those interested in using digital platforms.

This book contains information that will satisfy the scientific intuition of researchers and refine the sharing economy and Big Data knowledge of “amateurs”.

I.3. The challenge of this book

*As I change my thoughts,
the world around me changes.*

Louise Lynn Hay

The challenge of sustainable development goes by achieving millennium development goals, the first of which is the well-being of the society. The initiatives undertaken to meet the demands of the society are very diverse and take different approaches. They involve disciplines that seem dissimilar at first glance.

This is the ambition of this book! It claims to demonstrate the role of Big Data in the development of the sharing economy.

The sharing economy therefore includes digital platforms that connects buyers and sellers of goods and services. However, this sharing and collaboration would not be possible without the data, in addition to the algorithms, that drive the sharing platforms. Data are therefore the driving force behind this economy.

These large data-sets produced in various forms and in real-time, forming what we now call Big Data, require sophisticated methods coupled with analytical tools in order to create value. Managing data from sharing economy platforms is therefore a factor that promotes cooperativism, which can maximize beneficial economic, societal and environmental impacts.

Big Data contributes in many ways to the growth of this sharing economy, and we will, through this book, examine the different ways in which this is reflected.

By covering a wide range of topics such as Machine Learning algorithms, social innovation and sustainable development, this book provides concrete examples of successful use of the sharing economy, based on the analysis of large amounts of data. And we chose to use Python, a widely used data science language, to analyze the data of the practical examples in this book.

This book adheres to a practical implementation perspective for amateurs, but for professionals too. Its purpose is to familiarize you with the different concepts covered. It will provide emerging insights into the theoretical and practical aspects of Big Data analytics in collaborative and sharing applications.

It is the result of several years of research in environmental economics and Big Data analytics. It also draws on a data analytics experience within the SRY Consulting start-up, based in Montpellier (France).

I.4. How to read this book

Science is organized knowledge.

Herbert Spencer

The purpose of this book is based on two new concepts: the sharing economy and Big Data. These two concepts are well-known and have generated great interest in research in recent years.

Data is at the heart of the sharing economy, as it allows professionals in this context to operationalize their different practices. Exploiting this data and transforming it into value is a high-performance business strategy and this may make it seem complex. However, this is not the case. You can easily evolve your analytical capabilities and create opportunities at each step of your data analysis process.

Several studies have dealt with these two concepts, but separately. Thus, in this book, we have tried to combine them and deduce the possible relationship between these two concepts. We have organized each chapter so that each reader can approach it with confidence. The next three sections highlight what is specifically covered in this book.

Part 1: The shared economy or the emergence of a new business model

Part 1 discusses a literature review on the theme of the sharing economy. It aims to sketch a congruent overview of the state of the art and the knowledge needed to understand this “phenomenon”. In this part, we will present the sharing economy as an alternative to an outdated economy that is unable to meet the socio-economic and environmental expectations of individuals. It will shed light on the challenges facing the practices of the sharing economy and the possible risks faced by companies and society. Talking about the sharing economy cannot be done without mentioning the technology that has led to the emergence of this new business model, namely digital platforms. The latter provide the foundations of the sharing economy, but also ensure its realization and future.

Chapter 1, “The Sharing Economy: A Concept Under Construction”, discusses the emergence of the “sharing economy” concept and its rise to becoming a business model that disrupts the practices of a bygone economy, to the extent that it has created socio-economic and environmental problems.

In Chapter 2, “An Opportunity for the Business World”, we look at the consequences of adopting the sharing economy, namely the potential opportunities for the business world, as an optional approach in order to gain a competitive advantage.

Chapter 3, “Risks and Issues of the Sharing Economy”, examines the inevitable risks and challenges that the sharing economy covers for economic agents. How would producers perceive the new consumer behavior? Would they be able to embrace it? Or would they be on the defensive? How would individuals, who would see their jobs gradually disappear, react?

Chapter 4, “Digital Platforms and the Sharing Mechanism”, highlights the involvement of digital platforms in the process that is revolutionizing the context of sharing in economy. Although there is some reluctance to make this spirit of exchange a reality in commercial transactions through digital platforms, they still play a major role in spreading the values associated with exchange between individuals.

Part 2: Big Data analytics at the service of the sharing economy

This section presents a platform to examine different concepts related to Big Data and to show how this phenomenon transforms opportunities. It summarizes a considerable set of application examples in the sharing context. This section will be

of interest to all types of readers, as it addresses the general context of Big Data and highlights its importance for sharing economy companies. It examines the different ways in which Big Data can be beneficial for these companies.

Chapter 5, “Beyond the Word ‘Big’: The Changes”, provides an overview of the basic concepts related to Big Data, while illustrating the changes that have led to this phenomenon. This chapter will also highlight the importance of data for businesses and how it can increase their efficiency.

Chapter 6, “The Art of Analytics”, covers the most basic form of data analysis, from descriptive analysis to prescriptive analysis, by covering predictive analysis. This chapter is also an opportunity to discover the different steps of the data analysis process.

Chapter 7, “Data and Platforms in the Sharing Context”, presents an overview of Big Data applications. These applications come from the business world and show the interest that large companies take in this phenomenon. This allows understanding the power of data and the importance of digital platforms when realizing the strategies of the sharing economy companies. This chapter thus addresses the different challenges related to data and highlights the importance of data openness.

Chapter 8, “Big Data Analytics Applied to the Sharing Economy”, is detailed enough and potentially useful in order to build a global approach around the subject. This chapter demonstrates that the successful implementation of the data-driven culture is an important factor to carry out sharing economy practices. It reviews different Machine Learning algorithms and advanced technological tools for data analysis.

Part 3: The sharing economy? Not without the Big Data algorithms

This last part presents a range of advanced data analysis algorithms, including regression, classification and cluster analysis. It provides a set of techniques to anyone who wants to generate value from data based on the data analysis process. Using practical examples, we introduce fundamental principles of the Big Data analytics process.

Chapter 9, “Linear Regression”, discusses the essential techniques for modelling the linear relationships between explanatory variables and the outcome variable in order to make predictions on a continuous scale. After introducing the linear regression model, there is also a discussion of logistic regression, and Ridge and Lasso regressions. Based on an Airbnb database’s example, this chapter provides a

practical guide to explore the data and build a predictive model more efficiently, using Python.

Chapter 10, “Classification Algorithms” , revisits the origin of supervised learning and introduces the most common classification algorithms. This chapter is an introduction to the fundamental principles of different techniques that help to better classify data. Using the same Airbnb database, this chapter will illustrate the most significant features in the model definition.

Chapter 11, “Cluster Analysis”, moves the focus to another sub-domain of Machine Learning: unsupervised learning. This chapter will examine clustering algorithms, mainly *k-means* and hierarchical classification. To better understand the principles discussed throughout this chapter, a practical example will be introduced in order to show how to find groups of objects that share a certain degree of similarity.

In conclusion, our ambition is to make this book one of the first basic references of the sharing economy practices boosted by Big Data. We hope that this book will open up new horizons for you, by presenting new approaches that you may not have known before. We also hope that this will help you sharpen your curiosity and stimulate your desire to learn more about it.

PART 1

The Sharing Economy or the Emergence of a New Business Model

The Sharing Economy: A Concept Under Construction

What cannot be eschew'd must be embraced.

William Shakespeare

The Merry Wives of Windsor, Act V, Scene 5

1.1. Introduction

For more than 20 years, society's behavior has changed in terms of daily consumption.

In the interest of economic rationality, people, without knowing each other or being part of the same family, agree to live together, travel in the same vehicle, work in the same space and participate in common projects. They decide to join forces in activities such as production, distribution and consumption.

In other words, they have a new approach to economics, which involves collaboration and a spirit of sharing: it is commonly referred to as "the collaborative economy" or "the sharing economy".

A question challenges us: why did this concept appear?

Several factors have contributed to the advent of the sharing economy: the development of IT tools and mobile technology (smartphones, tablets), the globalization of the economy, the global economic crises and the environmental watch fueled by ecological awareness of the negative externalities of economic activity.

Indeed, we are witnessing a deterioration in the efficiency of the resources used. Demailly and Novel (2014) agree with this idea, arguing that: “For those in the sharing economy, it is nothing more or less than an underutilization of material goods, capital, and therefore an economic and environmental waste.”

We cannot consider the theme of sharing as recent, since the exchange of goods and services has existed, in many different ways, for a very long time: agricultural mutual cooperatives, insurance mutual and agricultural cooperatives already existed before the 21st Century. In other words, the idea of enjoying the good or service without owning it was part of people’s consumption strategies.

Also, the expansion of the sharing economy responds to the contemporary demands of people concerned about the quality of the environment and the degradation caused by the fierce economic activities on natural resources since the Industrial Revolution.

The sharing economy is a social phenomenon, in that it has allowed ordinary people to use their surplus resources in many forms and to consume in a mutual and altruistic way.

It is also environmental, because the sharing economy makes it possible to absorb excess capacity (infrastructure needs, car needs, etc.), reduce the exploitation of natural resources, and meet the needs of those that are most disadvantaged in society.

So, what is the “instrument” that has enabled the expansion of this economic phenomenon?

The notion of the sharing economy is in its conceptualization phase and does not yet have a consensus on its definition. It only dates back to the early 1990s. Indeed:

Collaborative economics is a concept carried by successful essayists such as J. Rifkin, R. Botsman or F. Turner, activists like Mr. Bauwens, media like Shareable in the United States, think tanks and do tanks like OuiShare in France, or by some entrepreneurs and start-up managers, and even more and more large companies. (Massé *et al.* 2015)

The conceptualization of the sharing economy is incipient, its advantages and disadvantages are not yet well defined. Although it is well received, it does not have an epistemological definition. In an ironic note, Bostman says: “The sharing economy lacks a shared definition.”

The sharing economy has become a global phenomenon. Thus, can it represent an economic model that competes with the traditional economy? What are the advantages of this new economy? Will it contribute to the sustainability of the economy?

1.2. From simple sharing to the sharing economy

The act of sharing is natural for us, it responds to a tangible satisfaction (exchange of goods and services), but also to self-satisfaction, to the extent that we put our humanity into practice in the relationships that unite us.

Human beings learn to share from an early age. As time goes by, the sense of ownership gives way to a sense of sharing. Moreover, it is religious beliefs that have inculcated the desire to escape the grip of self-centeredness within us. Monotheistic religions call for sharing through their main foundations and practices.

Thus, the concept of sharing is interpreted in society in several ways: cooperatives, mutual associations, volunteering, etc. The spirit of sharing was embodied in the development of digital technology, which has grown tremendously in recent years:

In cities, new digital technologies are revolutionizing the way we use transportation, housing, goods and other services [...] The sharing economy has disrupted virtually every sector, creating a multitude of markets based on platforms that connect individuals, businesses and communities. (Hodkinson 2017)

To understand the shift from the concept of “sharing” to that of the sharing economy, let us immerse ourselves in the history of its origin, its foundations and its practices.

1.2.1. The genesis of the sharing economy and the break with “consumer” society

Etymologically speaking, the word “to share” comes from the Latin *partes agere*: *partes* means “to make equal parts” and *agere* means “to push” and “to activate”. As a result, the concept has existed since antiquity and combines the two meanings: to divide an entity for a specific purpose. This can be a sharing of inheritance to benefit all heirs, or a sharing of power to delegate certain responsibilities.

In the notion of the “sharing economy”, each of the two words has kept its specificity.

Sharing always means leaving a part of something that belongs to us to one or more people, no matter how this action is carried out. It is the combination of the two words that makes the difference.

Indeed, the sharing economy has become the apanage of the solidarity economy and has experienced a staggering growth in recent years thanks to the development of information technology and mobile technology. *Via* software, or more precisely platforms, business transactions and meetings between suppliers and service providers are growing exponentially.

The term “sharing economy” was first added to the *Oxford Dictionary* in 2015. Similarly, the scientific literature on the concept is relatively new. Researchers looked at different aspects of the sharing economy using different names.

Among the names used, we can mention:

- peer-to-peer economy;
- collaborative economy;
- collaborative production and collaborative consumption;
- access economy;
- consumption based on access;
- local economy;
- peer production based on commonality and mesh size;
- product-system service and on-demand economy;
- wholesale economics;
- platform economy.

Nevertheless, the term “sharing economy” is the most commonly used term in the literature (Ranjbari *et al.* 2018).

“We believe that the economy of sharing can be the defining story of the 21st Century if we come together to build it.” These are the words of Natalie Foster, co-founder and executive director of *Peers.org*. The defenders of this ideology want to fight overconsumption and waste, create social equity and make the shared economy the “economic model of the third millennium”.