

[DOI: 10.20472/IAC.2019.052.057](https://doi.org/10.20472/IAC.2019.052.057)

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HOW DATA ANALYTICS DRIVE SHARING ECONOMY BUSINESS MODELS?

Abstract:

Several studies and reports published by McKinsey, Gartner, Cesco, PwC, etc., confirm that data analytics offers companies more value and allows them to the creation of new and innovative ideas. This is why the data-driven approach has been the subject of considerable publicity in recent years. This approach has given rise to the emergence of many business models, all of which have created their own way of doing things.

This is the case of many emergent business models who have noticed that several assets (goods or services) are not exploited effectively by the parties that hold them. We buy many products that we use only for a certain period and then put them aside. What if we could find one or more people who might need it?

This is the question that these innovative business models had taken into account. They could see potential monetary benefits in these different resources, simply by facilitating their sharing. Some succeed by bursting the value chains and shaking up the established players: Uber for taxis, BlaBlaCar for interurban carpooling, Airbnb for accommodation, etc., and this is, of course, just the beginning, because the trend is accelerating. These are fascinating ideas that have led to the emergence of the sharing economy.

But, one thing is clear, the ideas created by Uber, Airbnb, BlaBlaCar, etc. cannot be realized without determining what allows their development (how?) and, of course, the target (for whom?). These companies use the data to determine what to develop and target, to create untapped sharing market opportunities.

Many researchers have found the potential of large amounts of data produced and collected by many sharing platforms. The analysis of these quantities not only helps to promote the performance of these models or operationalize their activities, but also to predict economic results such as inflation, unemployment, housing prices, etc.

All sharing platforms and applications rely on data and analysis to develop practices and determine who to target. These data are increasingly used today because of the conjunction of a number of factors, such as:

- ☐The constant decrease in data storage costs;
- ☐The increase of the computing power;
- ☐The production of large amounts of data, which is largely unstructured and requires different operating techniques and which cannot be preceded by traditional methods.

Being able to generate value, in the context of the sharing economy, and make big data more profitable is based on the ability of companies to analyze the amount available data.

The challenge, therefore, lie in the ability to extract value from the amount volume of data produced in real-time continuous streams with multiple form and from multiple sources. In another word, the key to explore data and uncover secrets from it is to find and develop applicable ways in such a way

to extract knowledge that can conduct any business project strategies.

Indeed, recent years have been marked by the use of very advanced methods and computer tools previously reserved only for large companies. This has facilitated access to a large number of ways to create innovative ideas.

Therefore, in this paper the following research question will be answered: How the sharing economy companies use data and advanced analytics to boost their business models? Through this question, we recall the context of big data and analytics, their importance in sharing economy context, their challenges and the role they mutually plays to create new opportunities for sharing economy companies. We will, through this paper, see how sharing economy business models use data analytics to generate value.

Keywords:

Data analytics, big data, sharing economy, platforms, business model, innovation

1 Introduction

Several studies and reports published by McKinsey (2016), Gartner (2017), etc., confirm that data analytics offers companies more value and allows them to create innovative ideas. This is why the data-driven approach has been the subject of considerable publicity in recent years. This approach has given rise to the emergence of many business models (Botsman 2014; Sedkaoui and Khelfaoui, 2019a), all of which have created their own way of doing business.

This is the case of many emergent business models who have noticed that several assets (goods or services) are not exploited effectively by those that hold them. We buy many products that we use only for a certain period and then put them aside. What if we could find one or more people who might need them?

This is the question that these innovative business models had taken into account. They have seen potential monetary benefits in these different resources, simply by facilitating their sharing. Some succeed by bursting the value chains and shaking up the established players: Uber for taxis, BlaBlaCar for interurban carpooling, Airbnb for accommodation, etc., and this is, of course, just the beginning, because the trend is accelerating. These are fascinating ideas that have led to the emergence of the sharing economy.

But, one thing is clear, the ideas created by Uber, Airbnb, BlaBlaCar, and more cannot be realized without determining what allows their development (how?) and, of course, the target (for whom?). These companies use data to determine what to develop and whom to target in order to create opportunities in untapped markets for sharing (Sedkaoui and Khelfaoui, 2019a).

Many researchers have found the potential of large amounts of data produced and collected by many sharing platforms (Richter, and Slowinski, 2019). The analysis of these quantities not only helps to promote the performance of these models or operationalize their activities, but also to predict economic results such as inflation, unemployment, housing prices, etc. (Einav and Levin, 2014; Wu and Brynjolfsson 2015; Glaeser et al. 2017).

All sharing platforms and applications rely on data and analysis to develop practices and determine who to target. These data are increasingly used today because of the conjunction of a number of factors, such as (Sedkaoui, 2018a):

- The constant decrease in data storage costs;
- The increase of the computing power;
- The production of large amounts of data, which is largely unstructured and requires different operating techniques and which cannot be preceded by traditional methods (Chen and Liu 2014; Sedkaoui, 2018b).

Being able to generate value, in the context of the sharing economy, and make big data more profitable is based on the ability of companies to analyze the amount available data. The challenge, therefore, lie in the ability to extract value from a bi amount of data produced in real-time, in various forms, and multiple sources. In another word, the key to explore data and uncover secrets from it is to find and develop applicable methods in an innovative way, as suggested by McAfee and Brynjolfsson (2011) and Ross et al (2013), to extract knowledge that can conduct any business project strategies.

Indeed, recent years have been marked by the use of very advanced methods and computer tools previously reserved only for large companies. This facilitated access to a large number of ways to create innovative ideas.

Therefore, in this paper the following research question will be answered: *How the sharing economy companies can benefit from the use of data and advanced analytics to boost their business models?* Through this question, we recall the context of big data and analytics, their importance in sharing economy ecosystem, the role they mutually plays to create new opportunities for sharing economy businesses.

From an academic point of view, the scope of this study is due to its originality, by questioning the effect of big data on operationalizing the various activities of sharing economy businesses. We will, through this paper, see how sharing economy business models use data analytics to generate value.

The reminder of this paper is as follows structured. Section 2 covers the literature review related to big data and sharing economy necessary to understand the importance of these two universes. Section 3 handles the opportunities and challenges for sharing economy companies in the context of big data. Section 4 addressed to the big data analytics applications, and illustrates the power of algorithms by showing its wide range business applications examples and how it can be applied to generate value and for sharing economy companies. Section 5 presents a brief discussion to illustrate the key elements that allow sharing economy companies to develop data-driven approach. Section 6 concludes with implications, and limitations of the current study for further research directions.

2 Literature review

Before discussing the effect of big data analytics on the sharing economy context, a brief overview of what is big data and sharing economy is needed. Therefore, this section outlines an overview related to these two universes which have emerged in the digital context. It also discusses the emergence of the data-driven business models approach. This section is constructed with the intent to provide a comprehension of the context of this study.

2.1 Big data: An overview

When looking for a more complete overview of big data phenomenon, many people refer to the 3Vs model (volume, variety and velocity), stated by Doug Laney in 2001. This model is adopted by many institutions (Gartner, McKinsey, etc.), to establish a definition of this phenomenon. The volume, variety and velocity (McKinsey, 2011; Gartner, 2013) are three essential characteristics that help to understand big data and differentiate it from the old form of data. Because data exists over the time, but the volume, the variety and the velocity in which data is generated make it more valuable.

According to Gartner, this concept brings a family of tools that respond to challenges related to the 3 Vs model that includes the analyzing process of a large amount of data generated in a variety of types (structured, semi structured and unstructured) and produced in real time. Therefore, typically, these three Vs are used to define big data (Sedkaoui, 2018a).

- *The volume:* concerns the quantities of the data to be processed

- *The variety*: deals with the different sources and types of data, and refers to the heterogeneity of data acquisition, data representation, and semantic interpretation.
- *The velocity*: refers to the speed with which data are produced, analyzed and stored.

These three factors are an essential component of big data. They must necessarily be considered to manage, analyze and process the large amount of data generated continuously. The 3 Vs phenomenon is nowadays of paramount importance. Take the example of the world's leading technology companies, such as Facebook, Amazon, Apple, Netflix, etc. Much of the value they provide comes from their data, which they continuously analyze in order to produce and develop new products.

The various applications of big data have changed the business context considerably. Advanced analytical tools and algorithms have unlocked both big and small businesses' operational potential and have had an important effect on their different activities.

According to Frizzo-Barker et al. (2016), this phenomenon could potentially change the way companies think about data infrastructure, business intelligence and analysis and information system strategy (Sedkaoui 2018a). Companies will be able to enhance their decision-making process and therefore their performance by exploring the potential of data analysis (McAfee and Brynjolfsson 2011).

However, the real value of big data is only achieved when companies exploit the full range of opportunities offered by each byte of data. In other words, the differentiating factor in today's business is not having or collecting data, but the power to analyze it, transform it into information and extract knowledge (Ackoff, 1989).

2.2 Sharing economy

The growth of Internet applications and mobile technologies, changes in general attitudes, and the greater attention paid to sustainable consumption during the last few years have led to a new context characterized by sharing. The sharing economy has transformed the way participants and users communicate and connect with each other throughout the sharing process. This new economy has grown in importance and becomes a real source of potential and economic opportunities that should be analyzed more carefully.

Globally, the sharing economy relates to new consumption modes that enable customers to share goods or services. It points to a multifaceted buzzword that is currently used in a popular language, just as it is still disputed in the academic discussion (Davidson et al, 2018). Sharing economy refers to peer-based activities of sharing the access to goods and services, and it is coordinated through community-based online services.

Several companies operating within the sharing economy worldwide reacted positively to the trends in this economy and have affirmed their position within their industry. As shown in Figure 1, the sharing economy can be classified into several sectors.

Airbnb, Uber, BlaBlaCar, Lyft, Drivy, Quora, TaskRabbit, Wework Djump, Deliveroo, Haxi, Didi, CouchSurfing, Zipcar, Bag Borrow, Steal, Poshmark, etc., rely on the intensive use of digital platforms and which owe their success to the sharing economy.

Figure 1: Sharing economy companies by sector

Source: <https://foundershield.com/on-demand-shared-economy-insurance-trends/>

According to some researchers (Botsman and Rogers, 2011; Sundararajan, 2016; Acquier et al., 2017), the ecosystem of this economy is experiencing an unprecedented boom that can renew traditional conceptions of exchange. Peer-to-peer exchanges are multiplying in the most diverse fields, leading individuals to take the place of businesses in ever-increasing areas of activity. Therefore, the sharing economy is above all a symptom of the social impacts of digital context.

Beyond the underlying economic values and technologies used, this phenomenon transforms the way we live, create, work, consume, or acquire knowledge. In other words, this economy is known as collaborative consumption that people sharing of resources rather than having individual ownership (Sundararajan, 2016). The term itself describes a phenomenon that is based on the sharing of access or on the supply of goods or services, labor, and underutilized financial resources with sources of demand, resource providers and services, and digital platforms (Sedkaoui and Khelfaoui, 2019a).

The sharing of bicycles, cars, tools, beds, food, etc., has grown. Overall, in just a few years, this economy has greatly changed the industrial landscape and the way we do business, affecting the value creation process.

If big data enables companies to optimize their current operations, it also generates real opportunities to identify and create innovative ones for sharing economy businesses. This is what the following section will discuss.

3 Sharing economy in big data context: Opportunities and challenges

This section will be primarily focused on the opportunities offered by big data by providing with an overview of how data and analysis can help companies to better guide their business models. Then, it presents the different challenges that sharing economy companies can deal with in the big data area.

3.1 Data-driven business models

The range of opportunities offered by these technologies allows companies to transform their business model through new visions of the value chain into a vast, fully digitalized ecosystem. This involves new ways of operating and has led to a reassessment of the foundations of

business and an interpretation of new ways of creating value. When technologies become cheaper and easier to use, they transform businesses. This is the case with big data technologies, with a substantial reduction in data processing and storage costs (Sedkaoui and Khelfaoui, 2019a).

Many innovative business models have understood the importance of every data byte, and have differentiated their business models by exploring the power of data and the potential of analytics (Cukier and Mayer-Schoenberger, 2013).

Look at businesses like Amazon, where even the smallest decisions are data-based, even the color of the walls was decided by data. Whenever they have an idea, they analyze the data to validate it. Data is a key success factor and the companies that make good use of it will gain in competitiveness.

Many companies have realized how important data is and have oriented themselves towards building a culture that promotes sharing and that is based on and directed by data (data-driven). Look at companies like Amazon, for example, where even the smallest decisions are based on data. Whenever there is idea, Amazon analyzes the data to make strategic decision. Data is a main success factor and the competitiveness of businesses that make excellent use of it will increase.

Value creation, for the benefit of all stakeholders in the business context, is the main element of a company's success. However, in a generalized digitization ecosystem, be aware that evaluating and evolving a business model is not an option, because everything changes quickly and only the most agile companies will resist.

Table 1: Business models around data

Board area	Description	Examples
<i>Data as a service</i>	Companies that generate a large amount of data, but do not have the means at their disposal to collect or make them in forms that can be analysis	Municipalities generate transportation data that companies can seize for their own users
<i>Information as a service</i>	The product provides is directly the information obtained from the analysis of the data	Fitbit users produce the data and they pay for their visualization in graphical form
<i>Recommendation as a service</i>	The product provides is directly a specific recommendation addressed to users of the service to guide their consumption choices	Mint.com allows users to view their accounts and spending on their different credit cards to get a unified view of their budget. In exchange, it allows financial institutions to offer their products in the form of personalized recommendations

So, when a company makes a strategic decision to develop its project, data is always useful. Being a data-driven company means that there is a continuous conversation in both directions happening between data and the company's strategy.

Creating a model that is oriented and driven by data means making decisions based on the analysis of that data. More precisely, among the different data analytics opportunities, it is possible to identify three broad areas, (business model around big data) in which it creates value and has an impact on companies. These three areas are summarized in the Table 1.

However, beyond these well-known business models for which data generates value, there is another category in which data serve as a value creator, in particular through the exploitation of big data, without necessarily being directly present in the offer. In this category we find all companies relying on the use of big data to derive value. For example, we can mention Uber which uses data related to the location of its clients, its drivers, trips, traffic to determine the price (Sedkaoui and Khelfaoui, 2019b).

3.2 Challenges faced by sharing economy companies

In the big data universe, we can cross-reference three types of data: structured, semi-structured, and unstructured data illustrated in Table 2.

Table 2: Data types

Types	Characteristics	Examples
<i>Structured</i>	Organized and structured; may be stored in a database Easy to store and analyze (relational databases)	Databases
<i>Semi-structured</i>	Not stored in a relational database, but has organizational properties facilitating analysis	Web, logs, XML
<i>Unstructured</i>	Difficult to codify and leverage, requires tools and advanced software for analysis	Images, videos, data from social networks

But the most relevant data for companies in the sharing economy context is relational data (Smichowski, 2016) that shows the way users interact on a platform. In this context, we can distinguish three types of data:

- *Data supplied directly by a user*: such as profile information, photos, contact lists, etc.;
- *Data on user behavior*: from a platform or browser;
- *Data generated by the analysis of the previous two data types*.

Managing these different types of data emanating from the sharing economy's platforms favors cooperativism, this can maximize the economic, societal, and environmental effects.

However, in the sharing economy the first types extremely relational. This means that if, for instance, an individual X (from City A) rents the home of another individual Y (in City B) using a platform, the data refers to two individuals. This may also be the case with some data provided, such as photos where a number of people appear or a contact list, etc.

This presents an issue because almost all individuals must agree that the data can be used. But the context of big data involves more than these two individuals. This is to say that big data analytics is only useful when large amounts of data are analyzed in real time. What counts is the use of data, which includes millions or even billions of bytes of distinct data types.

In addition, the different types of data described previously must be protected in the context of the sharing. This is to say that we can highlight two statements (Ranzini et al. 2017):

- The first concerns *the security of the data exchanged between users and the companies that created these platforms*. In return for the security of their data, these users are able to participate on these platforms. But it should be noted here that these platforms are reluctant to share data from their users, which is important for better estimating the impact of the sharing economy (Frenken and Schor 2017). This can harm the platforms themselves, by limiting the potential size of the sharing economy;
- The second is related to *the security of the data that users exchange with each other in order to access goods or services*. The creation of sharing platforms thus raises privacy protection issues to the extent that they involve not only the sharing of goods and services but also the sharing of data by simply using the platforms.

In the context of Big Data, the challenges faced by businesses in the sharing economy extend beyond privacy and security. Other challenges, such as problems related to the complexity, scalability, heterogeneity, quality, and timeliness of data, are also a major concern. These problems should be taken seriously by companies in the sharing economy during the analysis of massive datasets and the development of their analytical process.

4 How big data affect sharing economy activities?

This section will be an opportunity to learn about a variety of analysis techniques and algorithms, and how they can be applied in the context of sharing. Thus, we will see how sharing economy businesses use big data to generate value. But first, we will discuss the different ways sharing economy businesses can use big data analytics.

4.1 How sharing economy businesses can seize the opportunities offered by datasets?

Without big data, it is much more difficult to make the sharing economy work. It is a huge task to create synergies between the needs of customers, freelancers and companies. Big data allows sharing economy companies to see trends in how things are being used, seek opportunities to create value through sharing, and ultimately create a business model around a new way of sharing.

Obviously, these companies can adopt a data-driven approach in several ways, by (Sedkaoui, 2018a):

- Using big data technologies,
- Exploring new methods that can find correlations between the quantities of available data,
- Developing algorithms and tools capable of handling a wide variety of data,
- Optimizing the analysis process, etc.

Big data contributes to the development of this economy in many ways, these includes:

- Data, on a very basic level, is the foundation of most of the services that make up the sharing community. Consumers convey what they are interested in, that information is transferred to the globe and then replied to it by the service provider.
- Big data algorithms on a bigger scale are capable of connecting individuals with more particular elements of what they are looking for. These algorithms use information such as GPS places, as well as other personalized information points to link customers to suppliers that most meet their requirements. Indeed, it is this effectiveness that makes services such as Uber so popular. Consumers enjoy the ability to meet their accurate requirements by clicking a few buttons on their connected objects.
- Big data is also the way in which start-ups can enter the market on an affordable basis. Data provides start-ups the chance to readily interpret and anticipate the requirements of customers. This, in turn, both informs the quality of the service supplied and even allows start-ups to obtain broad and extensive assistance from the Crowd Funding groups. They can then use that information to guarantee that their concept enjoys a wider attraction and thus receive more funding.
- Through the sharing platforms, drivers, authors, real estate owners and distributors are able to develop their own companies easily by merely placing their data on wide platform pages and making it visible to customers who need the services they provide. As a consequence, many experts have full autonomy over their careers and simple access to clients and customers who need precisely what they have to offer.
- Also, one of the most significant roles that big data performs in the sharing economy is how it allows clients to read freelancer reviews before they are recruited. Sites like Freelancer or Upwork compile reviews of their freelancers and services. This data enables the finest employees to shine and connects customers with the greatest possible quality of services.

This is how big data drives the sharing economy, creating new opportunities for people around the world. This gives an overview of how these companies can develop a new model in the sharing economy context through the use of data analysis tools that allow them to explore large amounts of data and to generate value.

This new wave is based on the phenomenon of big data and the opportunities that can be generated by analytical practices. Without data analysis, companies cannot meet the needs of their customers in real time. Identifying resources and targeting the people who need it, informing those who have them, and facilitating communication between the various participating parties, appears to be a huge task. Sharing economy companies therefore need big data analytics to see market trends and the various opportunities created by sharing. Without real-time analysis of large amounts of data, these models cannot achieve the value offered by the context of sharing.

The new wave is based on the phenomenon of big data and the possibilities that can be created by analytical methods (Ohlhorst 2013 ; Morabito 2015 ; Henke et al. 2016 ; Foster et al. 2017 ; Sedkaoui 2018a). Without data analysis, companies cannot fulfill their customers' requirements in real time. Identifying resources and targeting individuals who need them, informing those who

have them, and facilitating communication between the multiple sides, seems to be an enormous challenge (Sedkaoui and Khelfaoui, 2019a).

Sharing economy businesses therefore need big data analytics to see market trends and the different possibilities generated by sharing. Without a real-time analysis of large amounts of data, these business models cannot attain the sharing context value.

4.2 Big data algorithms for sharing economy businesses

Changes in the global economy have led to new dimensions that create new patterns of competition, consumption, production and value creation. Nowadays, the sharing economy is a set of economic and social activities around which community members share properties, resources, time and even skills via digital platforms.

This new economy includes new methods of communication between performers, leading to a re-examination of the fundamentals of traditional channels and an awareness of new types of collaboration. But this sharing and collaboration would not be possible without the data and of course the algorithms that drive platforms. Therefore, by connecting to these virtual spaces where billions of people cooperate and work independently (Rifkin 2014), we transmit large amounts of data.

Thus, the digital revolution has led to a data revolution that gave companies the power to collect large datasets. The defining feature of this trend thus concerns big data (Sedkaoui and Khelfaoui, 2019a). Exploiting these data effectively leads companies to better understand and interpret consumer behavior and, as a result, easily identify their needs. This involves:

- Exploring data from different platforms and practices in the sharing economy;
- The development of relevant means and methods for extracting the knowledge that can lead to successful strategies.

In this context, there are a large number of algorithms that we can use to explore and analyze big data. We list the most common algorithms in the Table 3.

Table 3: Big data algorithms

Analysis	Algorithms	Problem to treated
<i>Simple</i>	Simple regression	Regression
	Multiple regression	
	Naïve Bayes	Classification
	Logistic regression	
	Hierarchical classification	Cluster analysis
	K-means	
<i>Complex</i>	Decision tree	Classification / regression
	Random Forest	
	Bootstrap	
	Support Vector Machine (SVM)	
	Neural networks	
	kNN	

Regression, classification and cluster analysis are of paramount importance in the data analysis process and appear to be the most widely used algorithms. In the sharing economy context, these algorithms can be used, for example, to (Sedkaoui and Khelfaoui, 2019a):

- *Classification* when we want to look for words (people, places, etc.) in a text or when we try to identify people in pictures or voice recordings, etc.
- *Regression* is used to predict how susceptible people are to spend in exchange for a good or service, the number of customers who may be interested in specific resources, to help Uber drivers, for example, to predict which car parts are likely to fail, to prevent payment fraud, or to create a robust ratings system.
- *Regression* and *classification* can be coupled together and applied to identify potential customers for apartments or houses on Airbnb or to look for tourist destinations near a specific location.
- *Cluster analysis*, which is another algorithm that we can use to analyze data from sharing economy platforms. This type of analysis can be used to analyze the attitudes of sharing economy platform users; for example, by associating socio-demographic factors with other variables related to sharing, to find groups (or clusters) based on these factors. This analysis can also be applied to examples where we seek to assess the motivations of users based on their sharing behavior. This is possible in the case of peer-to-peer platforms.

In addition, we believe that the deployment of the *sentiment analysis algorithm* is of greater importance because it will allow sharing economy companies to efficiently automate user feedback platforms by creating graphics for assessing their satisfaction. Therefore, the value of big data algorithms is their predictive power (Lundqvist, 2018).

Also, to fully exploit the potential of big data, companies need powerful tools to process, analyze, and store the quantities of data they produce and collect daily. Various types of tools and technologies have been developed to streamline the data analysis process and create an ideal environment for the application of different data analysis algorithms (Sedkaoui, 2018a). Hadoop, Spark, Python, Matlab, R, and other tools and features for managing and analyzing big data offer a variety of algorithmic applications.

4.3 How sharing economy companies use big data: Examples

Recognizing the potential of the sharing economy, companies like Uber, Airbnb, Didi, BlaBlaCar, Bag Borrow, Lyft, and many others have become key and recognizable elements of the consumer landscape. From transportation to tutoring to holiday hunting, these companies, which have changed the way we interact with the world and use our own assets, have taken steps to transform their business models. We will state in the following, the variety of big data applications used by some companies in the sharing economy.

Uber

At Uber, the combination of big data technologies and algorithms have made it possible to analyze different types of data in order to understand the behavior, locations, and preferences of its customers and to more effectively manage the availability and positioning of the driver. In

addition, Uber has developed algorithms to monitor traffic conditions and travel time in real-time (Marr 2016; Sedkaoui 2018b).

Consequently, prices can be adjusted according to demand and travel times. This pricing method, based on the analysis of large data, has been patented by Uber. This is called surge pricing or the implementation of “dynamic pricing”, already used by airlines and hotel chains to adjust prices to demand in real-time through predictive analysis.

Uber's data-driven approach allows it to expand its market and to operate in over 450 cities around the world. This approach also concerns data visualization. Uber seeks to optimize urban travel time in major cities. Initially, the company was interested in setting up a demand-based pricing system (the Geoserve system based on the level of supply and demand depending on location) (Sedkaoui and Khelfaoui, 2019a). The data from this system was used to optimize the movement of drivers in order to reach a new understanding of mobility. It can reveal urban rhythms based on a real map of the city as a function of sectors and traffic schedules.

Airbnb

Just like Uber, Airbnb has adopted several big data applications for:

- *Search processing and personalization*: this is the basic principle of the Airbnb platform, which assists helps throughout their search. Depending on each search, algorithms analyze data in real-time and create offers to match each person's wishes;
- *Price prediction*: to determine the value of an apartment or a house, Airbnb uses a pricing algorithm called Aerosolve. This algorithm will take into account many variables: the city, month, type of property, transportation, etc. In addition to traditional variables, Aerosolve also analyzes images to determine the price (Sedkaoui 2018a);
- *Facilitating employee tasks*: while the algorithm helps rental companies set their prices, Airbnb also provides a platform for its employees to ask questions and make decisions. In recent years, many employees have used this platform, which contains both structured and unstructured data (Marr 2016): images, rental data, the number of rooms, various events, etc.;
- *Assessing users' opinions based on comments*: we've mentioned this before. It's possible to analyze and evaluate the users' (positive and negative) comments.

With these applications and many more, data doesn't just produce valuable information that helps guide Airbnb's decision-making process and operationalize its various activities. Beyond that, the company considers this data as the voice of its customers. Thanks to the data-driven approach that the company has adopted, its lens has widened to amplify these voices. In other words, to determine which actions or decisions to take or not to take, to illustrate the potential of these voices, and to improve business performance (Sedkaoui and Khelfaoui, 2019a).

BlaBlaCar

The case of BlaBlaCar in the big data arena illustrates the potential of Analytics and what it can bring to the management of a carpooling service. BlaBlaCar was developed based on a data-driven approach to better anticipate and meet the needs of its customers. In addition to A/B testing, its work with big data analyzes user behavior and optimizes its interface, the performance

of its customer relationship management campaigns, and the ergonomics of its platform (Sedkaoui 2018b).

BlaBlaCar's rapid growth relies in large part on the success of its marketing campaigns and its platform's ability to build customer loyalty. Far from being a coincidence, these two strengths are based on the judicious confluence of a Hadoop cluster and a platform for analyzing large amounts of data. Using its data-driven approach, BlaBlaCar processes the data of its customers and deploys new features to meet their needs.

Lyft

Lyft's applications generate large amounts of data that the company collects and analyzes. Data about drivers and users, data on vehicles and their locations, data on speed and acceleration, etc. Lyft's data is diverse and voluminous. Just like Uber, Lyft collects all of this data and analyzes it to monitor the functionality of the most frequently used services, to analyze usage patterns, to determine customer waiting time, etc. All of these elements must be implemented in real-time.

To do this, Lyft uses a variety of tools (see Table 4) and advanced technologies that have evolved over the years (Yang 2018) to analyze large amounts of data. It has shifted from AWS products, for managing its exponential growth, to Big Data technologies like Apache Hive, Presto, Flink, Kafka, etc. (Sedkaoui and Khelfaoui, 2019a).

Table 4: The evolution of Lyft's data analysis pipeline

Year	Technologies adopted
2015	Auto Scaling, Amazon Redshift, Amazon Kinesis, MongoDB, DynamoDB, Amazon EC2 Container Registry
2016	Hive, Spark, Airflow
2017	Presto, Kafka, Flink
2018	Druid, Superst

Other examples

Recognizing the potential of the sharing economy coupled with the analysis of large amounts of data, some companies are taking steps to transform their business models (Botsman 2014). For example, DHL realized that its practice of dropping packages off to its customers in collection points rather than delivering them to their homes frustrated customers. To alleviate this problem, it launched MyWays in 2013, which allows peers (people wishing to carry packages on demand) to buy and deliver packages on the last kilometer to DHL customers, thanks to crowdsourcing. Similarly, realizing that it had unused meeting space, Marriott has partnered with LiquidSpace, a marketplace that helps people find places to work.

Other sharing economy models range from "brand as a service", as in the case of Whole Foods, which partnered with Instacart, or even BMW with Daimler by respectively offering the DriveNow and Car2Go on-demand transport services, to "advertising partnerships" such as those between KLM and Airbnb or Lyft and MasterCard (Owyang 2015), etc.

5 Discussion

Apartment rental, carpooling, sales between individuals, or the sharing of talents are different facets of the sharing economy. Beyond disillusionment with consumerism, this trend is driven by data. Most of the services of the sharing economy would not be viable without the exploration of big data. The sharing economy companies do only represent a new way of thinking, but also a new way of using data effectively to provide customers with what they want, when they want it, where they want it. The most obvious examples are Uber and Airbnb. Both companies have developed their own platform to allow service providers and users to connect their interests.

Whether it is: industry, cybersecurity, education, financial services, healthcare, retail or any other area company must think about data analytics which becomes a strategic go to for businesses. In order to succeed a data-driven approach and operationalize sharing activities, it is necessary to ask some question, mainly: why, what and how.

- *Why:* Refers to an in-depth analysis of the goal that businesses want to achieve, by accessing this data, as well as an assessment of the investments and expertise that the project needs, are required but too often overlooked in the context of the deployment of a big data strategy.
- *What:* In all sectors, companies are now considering turning the corner on big data and analytics. They recognize in the data a largely untapped source of value creation and an exclusive factor of differentiation. This refers to the added-value beyond data analysis process.
- *How:* Conduct a data-driven project means also be able, in particular, to answer questions such as: How can we be sure that big data could help us to create business impact? Who should be involved and when? What are the key steps that need to be attentive? Is the project on the right track to succeed? Etc. It is therefore essential, for data-driven orientation, to ensure:
 - For the data: quality, security, structure ...;
 - For the process: well-defined organization, a data-driven culture, its direction ...:
 - For tools: IT infrastructure, storage, data visualization capability, performance monitoring.

In order to extract value from big data, it must be processed and analyzed in a timely manner, and the results need to be available in such a way as to be able to effect positive change or influence business decisions. It is important to ensure that the project is progressing towards the intended result (Sedkaoui and Khelfaoui, 2019b).

In this context, sharing economy companies must follow an approach based not only on data but also on making it available, or Open Data. This is very important for drawing more benefit from the third party services (platforms) and data reuse.

Therefore, the complex sharing economy practices lead to the need for better collaboration but also better sharing of data between participants. The different models adopted by the companies in the sharing economy are made possible by the large amount of data they collect from their users and by the data analysis techniques they adopt to analyze the available data.

Many experiences in the sharing economy argue that big data analytics is at the heart of their success. Story. These companies have developed innovative approaches to data collection and analysis, and these methods are largely responsible for their success.

6 Conclusion and future research

Big data and the sharing economy are the two areas that have most affected the digital ecosystem. The analysis of large volumes of data has allowed sharing economy companies to launch many applications for users. The use of platforms by these users leads in turn to increasing amounts of data. This requires more advanced data analysis techniques, thus opening the way for algorithms that adapt to the different characteristics of big data and become more effective in identifying patterns and extracting information.

In this paper, the authors addressed data-driven approach and its roles in operationalizing sharing economy activities. It illustrates also how companies can use big data analytics to boost their activities in the sharing economy context. This paper demonstrates that by adopting a culture based on data and analysis many business opportunities can be seized. It examines why new analytical methods are needed for sharing economy businesses to meet the challenges of their increasingly changing environment. However, the use of tools and methods of analysis is not just about implementing new technologies to capture and analyze the vast amounts of data available on the platforms, but rather to extract value and create useful information to better guide and optimize the decision-making process.

In this context, empirical studies are also needed to highlight the importance and the role of big data and data analysis techniques and algorithms in the context of the sharing economy. It will be necessary also to show how these different techniques can help sharing economy companies to better manage the data and face the various challenges imposed by the technological advent.

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