Big Data Analytics for the Small Social Enterprise

How to Create a Data-Driven Approach to Address Social Challenges?

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Abstract— **Big data and the use of data analytics are being adopted more frequently, especially in companies that are looking for new methods to develop smarter capabilities and tackle challenges in the dynamic processes. This study pays a particular attention to the role of big data analytics as an immense potential for addressing societal challenges. It focuses on how to conduct a data-driven approach to better address social concerns and challenges that social enterprises, especially the small ones, are dealing with. The purpose of this paper is to explore and show how social enterprises can harness the potential of big data and how the analytics power can help them find creative solutions to the various societal concerns.**

Keywords: big data; social innovation; SSEs; Analytics; data-driven.

I. INTRODUCTION

In the context of social advancement, the availability of big data enables every individual in a developing community to engage in economic activities, such as social entrepreneurship [1]. Exploiting big data can also be used to help make decisions to reduce large-scale social problems and address societal challenges. Many experiences, over the world, show how big data analytics can generate value for social good.

Glow, for example, developed an app using big data to empower women to gain better insights into their reproductive systems. Or, IBM's Canadian Smarter Health study aggregates millions of data elements from monitors in ICUs to identify early warning signs of potential newborn infections, pinpointing issues that even the most experienced doctor would not have caught using traditional practices [2]. Also, social listening data helped AT&T to identify the growing sensitivity to texting while driving as a relevant cause and communications platform.

At this stage, one must wonder 'how do they do it?' Somehow, the answer lies in the fact that these enterprises have seen the potential in using analytics not only to differentiate their business models but also to innovate. The power of big data has evolved to become a primary tool in creating patterns, modeling, and recognizing predictive patterns, which, in effect, offers valuable insights for social entrepreneurship to create life-changing opportunities [2].

Despite its importance for Social Innovation (SI), we have noticed that few studies have analyzed the power of big data in enhancing Small Social Enterprise (SSEs). SSEs are concerned as well with the big data phenomenon, which is also changing the social impact and needs

A SSE is a form of enterprise that places the general interest above profit, which aims to meet social and environmental challenges while remaining economically viable. The fields of application of big data analytics in social context are numerous, such as: occupational integration, disability, diet, environment, etc. From health to agriculture and transport, from energy to climate change and security, many business models recognize the opportunities offered by the enormous amounts of data created in real-time. These models can be provided as a roadmap for this category of enterprise that seeks to become more successful social actors by leveraging big data analytics to guide their social engagements.

But, they must understand the evidence of new opportunities for finding appropriate solutions to societal problems through big data analytics, which has opened new doors and unleashed data's potential. Furthermore, the paper creates a roadmap to help them to deal with social issues when working with big data.

Therefore, in this study the following research question will be answered: *How can social enterprises drive an analytical approach to get more value out of the data and optimize their business model in order to better conduct their project?* Through this question, we recall the context of big data, its importance in conducting decision-making, its challenges and the role it plays as a complement to create new opportunities for SSE in order to address the societal issues.

This study will cover and discuss the basic concepts that lie behind the big data analytics in order to highlight its importance in the SI ecosystem. It does not focus on the technical aspect of big data, such as how to store and process large amounts of data, rather, it explores why and how SSEs might engage operationally with data analytics to better operate in their ecosystem and derive solutions that allow them to improve SI.

The rest of this paper is organized as follows. Section II describes a short overview of big data analytics. Section III describes the challenges and the relevant questions when

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working with data. Section IV gives key elements to undertake in big data analytics for SI. Section V discusses the development of a data-driven approach for the SSE. The conclusions close the study.

II. BACKGROUND: UNDERSTAND BEFORE UNDERTAKE

Before talking about how the social sector can use big data for SI, this section will discuss the basic concepts of big data analytics in order to understand the potential of working with data.

A. Data Analytics Power

Many companies have realized that knowledge is power, and to get this power they have to gather its source, which is data, and make sense of it [3]. This was illustrated by the famous "knowledge pyramid" (see [4]), described as a "knowledge discovery".

According to the Oxford dictionary, data are defined as: "*the quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media*".

The potential of data analytics algorithms is deeply related to the potential of data because data are the material that Information Technology (IT) tools will harness. Data are, therefore, a form of wealth, and exploiting it results in an essential competitive advantage for an ever-tougher context. In big data age, enterprises will come across many different types of data (structured, semi-structured and unstructured), and each of them requires different tools and techniques.

The power of data analytics and their applications, in the big data age, is no longer to prove. All sectors are warming up to the benefits of big data analytics. Big data has radically changed the way data are collected and analyzed since it introduces new issues concerning volume (how much?), velocity (at what speed?) and the variety (how diverse?) of the data available today.

Understanding big data means dealing with data volumes that are significantly higher than those previously analyzed, at an incomparable speed (velocity), all while integrating a widely richer data variety. It is no more about the word 'big' now, but it is more about how to handle this 'big' amount of structured, semi-structured and unstructured data, that cannot be managed with traditional tools, and deal with its high diversity and velocity to generate value [5].

The added value of big data is the ability to identify useful data and turn it into usable information by identifying patterns, exploiting new algorithms, tools and new project solutions. The idea behind the term 'big data' is the one that justifies that we talk about revolution and not a simple development of data analysis. What big data brings is the ability to process and analyze all types of data, in their original form, by integrating new methods and new ways of working.

The case of many companies' experiences illustrates that data can deliver value in almost any area of business. Turning data into information and then turning that information into knowledge remains a key factor for business success. So, data in itself is not a power; it is its use that gives power, and more one gives an exchange of data and information, more one receives [6].

Big data then is about collecting, analyzing and using data efficiently and quickly with new tools to gain a competitive advantage by turning data into knowledge and generate value.

B. How to Generate Value and Extract Useful Knowledge

Overall, the approach seems to be simple: (i) we need data; (ii) we need to know what we want to do with it and (iii) how to do it. This idea can be formalized using the following definition [7]:

"Analytics is the process of developing actionable insight through discovery, modeling and analysis, and interpretation of data".

While:

- The idea of *actionable insight* is applied to convey that the objective of analytics is to generate results that directly increase the understanding of those involved in the decision-making process [8].
- *Discovery* refers to the problem definition and exploratory element of analytics; the identification, collection, and management of relevant data for subsequent and/or concurrent analysis. This discovery stage integrates in [8] emphasis on a problem definition, with what [9] conceptualizes as data management, which includes:
  - Problem definition: identify what data to collect, and begin acquiring it. But, the volume of data manipulated by some companies has increased considerably and is now in the order of Petabytes, Exabytes, and even Zettabytes. Chen et al. [10] highlight the multitude of techniques that allow organizations to tap into text, Web, social networks, and sensors, all of which enable the acquisition and monitoring of real-time metrics, feedback, and progress.
  - Data collection: The collection and combination of semi-structured and unstructured data require specific technologies, which also have to account for data volume and complexity.
  - Data management: Data management involves the storage, cleaning, and processing of the data.
- *Modeling and analysis* are concerned with applying statistical models or other forms of analysis against real-world or simulated data. The middle stage of this categorization involves making sense of the acquired data, to uncover patterns, and to evaluate the resulting conclusions [11].
- *Interpretation* involves making sense of the analysis results of, and subsequently conveying that information in the most comprehensible form onward to the relevant parties. In another words, making sense of different types of data and generate value from it, results in some form of finding.

The most important asset of big data has to do with the fact that they make it possible to apply knowledge and create considerable value. But, before one attempts to extract useful knowledge, it is important to understand the overall approach

that leads to finding new knowledge. The process defines a sequence of steps (with eventual feedback) that should be followed to discover knowledge in data. To complete each step successfully, effective data collection, description, analysis, and interpretation must be applied [5][12].

Each step is usually realized with the help of available software tools. Data mining is a particular step in this process – application of specific algorithms for extracting models. The additional steps in the process, such as data preparation, data selection, data cleaning, incorporation of appropriate prior knowledge, and proper interpretation of the results of mining ensure that useful knowledge is derived.

III. ENHANCE INNOVATION WITH BIG DATA

This section is interested in investigating the challenges that SSEs are dealing with in order to map out an efficient plan to improve solutions for social issues.

A. Challenges that Social Enterprises are Dealing with

Recently, many studies have employed big data and analytics for SI [13][14]. The potential for innovation through data uses and analyzes exists, but, it should be noticed that there are some obstacles to overcome. The challenges that social enterprises are dealing with are in many ways very complex compared to those of enterprises in business or science sector, which can make the use of big data that much more difficult. In this context, greater attention must be paid to the data security and privacy.

So, being a social enterprise is a challenge itself and small enterprises must recognize the importance of investing in big data analytics, given its important role as a value generator. In order to harvest value from big data, social enterprises have to address some challenges, such as:

- *Big data dimension:* Each dimension presents both challenges for data management and opportunities to advance decision-making. The 3 V's provide a challenge associated with working with big data. The volume emphasizes the storage, memory and computing capacity of a computing system and requires access to a computing cloud. The velocity stresses the rate at which data can be absorbed and meaningful answers produced. The variety makes it difficult to develop algorithms and tools that can address that large variety of input data [15].
- *Technological context:* One of the main issues is the incompatible IT infrastructures and data architectures. IT systems and software should be able to store, analyze, and derive useful information from available data [16]. The most successful companies understand the limitations of the technology behind their big data operation and recognize the importance of combining analysis with a sound understanding of the context, a good intuition for the industry, and a critical attitude towards insights derived from data.
- *Managerial context:* The keystone of big data exploitation is to leverage the existing datasets to create new information, enriching the business value chain [15]. The major challenge to overcome is the management's lack of understanding of the potential value big data can bring to companies [16]. The goal was to manage the increasing amount of data, information and to ensure its usage and flow across the organization. Data are required to be managed in different steps and most of all analyzed [17], for organizations to gain knowledge and value.

A large part of this challenge, for SSEs, lays in the complexity of data collection, data analysis, data security, and how to turn that data into usable information by identifying patterns, exploiting new algorithms, tools, and new solutions to address social concerns. They are required to deal with these several issues to be able to seize the full potential of big data.

B. Making Plans: Beginning by Understanding

The biggest confusion of the importance of big data (*why?*), as with every major innovation, lies in the exact scope (*what?*), and its implementation (*how?*). In this context, SSEs must pay attention to the data's boundless opportunities, if they want to generate solutions to address social challenges. They must adopt a 'data-driven approach'. To better conduct this approach, one needs to have a clear objective. In other words, the clearer the objectives, the more focused and rewarding the analytical approach will be.

Of course, there are multiple ways a social enterprise can become more data-driven. For example, by using big data technologies, exploring new methods able to detect correlations between the quantities of available data, developing algorithms and tools that can address that large variety of input data, by optimizing the Business Intelligence process, and more.

SSEs must, therefore, seek the information where it is not, and the most popular way is probably to ask a lot of questions and see what sticks. SSEs must seek for the innovative idea by asking relevant questions [5]. Two essential components are needed to question whether data analytics can or cannot add value to a SSE:

- *Data:* What should be done here is exploring all possible paths to recover the data in order to identify all the variables that affect, directly or indirectly, the phenomenon that interests the social project. An important procedure is to understand the data that will be collected and then analyzed. The idea is that the more we have a good understanding of our data, the better we will be able to use them wisely. This aims to precisely determine where we should look for the data, which data to be analyzed and identify the quality of the data available but also link the data and their meaning from a business perspective.
- *Definition of problem statement:* Everything in big data analytics begins with a clear problem statement. Determining what type of problem a social enterprise is facing with, will allow the enterprise to correctly choose the technique that can be used. The success of an analytics approach cannot be possible without the clarification of what

we want to achieve and what is need to be changed to embrace the advancement that big data entails. This is not just valid in big data context but in all areas.

Big data is opening up a number of new areas for social enterprise. Just as Facebook has made it easier to share photos, new analytics products will make it far easier not just to run analysis but also to share the results with others and learn from such collaborations [18].

Public institutions, such as the US government, the World Bank, etc., have understood the power of data analytics. They made their data available (open data) to be exploited and analyzed. This perspective allows many enterprises and businesses to create innovative applications able to address societal concerns.

Asking interesting questions develop their inherent curiosity about data that they are working on. The key is thinking broadly about how to transform data into a form which would help to find valuable tendencies and interrelationships. The following types of questions seem particularly interesting to better guide a social project:

- What things can SSEs learn from the data?
- How can they ever understand something they cannot see (making sense)?
- What techniques, methods, and technology do they need to improve their project strategy?
- How to avoid mistakes and get the best models?
- How can they learn lessons by analyzing available data, and what they can do with it?
- How to use the results (models) efficiently?
- What impacts do they expect on the choices to be made? Etc.

This kind of questions allow them to better conduct their project based on data and analytics, that means think about the 'meaningful' of data, so its 'practice' [5].

IV. BIG DATA ANALYTICS AND SOCIAL ENTERPRISE

This section discusses the key elements that can help the enterprise to conduct a data-driven-approach for SI.

A. *Big Data for Social Sector: Challenges and Opportunities*

The generalization of the cloud, intelligent devices, big data and Artificial Intelligence (AI) coupled with new human-machine interfaces have revolutionized the business world and upset the entire economic landscape. With the emergence of smart devices, the Internet of things (IoT) and big data age, more and more social enterprises rely on the use of technology.

According to [2], the concept of smart data is considered as an exponential part of creating a prosocial brand. In her research, she discussed the opposite characteristics of doing social good and big data because both recognize the important aspects of contemporary markets. The SSE seeks to create a sustainable business strategy that will encourage the formation of social values while big data encompasses growth expectations attributed to private markets [1].

Social enterprises can also promote the achievement of SI through the utilization of big data analytics. It is the case of many examples that highlight the potential of big data for SI. The idea is to combine the passion for social change with the data analytics field.

In Bhopal India, for example, the Panna Tiger Reserve is using drones (unmanned aerial vehicles) to safeguard against tiger poachers. The data collected has allowed them to improve the efficacy of their efforts and to prove the impact of their activities, thus encouraging greater support and funding for their initiatives [2].

Also, the 'Ushahidi' application, designed to map violence after the Kenyan elections in 2008, collects and disseminates data about urban violence, allowing users to avoid it and public authorities to prevent it. As for the 'I Wheel Share' application, it facilitates the collection and dissemination of urban data likely to be useful for people with disabilities [5].

Or even 'Deuxio' the portable sensor developed by 'Plume Labs', which measures local air pollution in real-time and communicates results and data with users. The 'Victor & Charles' provides service that allows hotel managers to access the digital social profile of their customers in order to adjust at best their services.

The Social Innovation Program of Qatar Computing Research Institute (QCRI), in partnership with several humanitarian organizations, applies big data analytics to improve humanitarian response.

Also, the Daniel Project, another successful example of using big data analytics for social impact, Intel's collaboration with Not Impossible Labs to 3D-print prosthetic arms for a 14-year old war victim. Intel's data competencies contributed significantly to the technological solution [2]. The video of this initiative, shared on social media, captured the hearts and imaginations of consumers across the world and earned Intel more than a half-billion online impressions, an impressive quantification of the intrinsic value of social branding [2].

These examples and many others show the potential of data-driven approach and its actual impact in helping solve social problems. Big data is considered a new form of capital in today's marketplace [19][20], many firms fail to exploit its benefits [21]. For SSEs, it is known that they are unlikely to analyze data on the same scale as large companies (Google, Facebook, Amazon, IBM, etc), due to their limited sources, skills and IT tools.

It is possible that they are engaging with the free big data tools provided by companies like Google, without forgetting the increase in the prominence of social networks and the fact that engaging with social media, which can help generates exposure and traffic for SSEs at a much lower cost than traditional marketing approaches [22].

But, it is to highlight that they are unlikely to have capacities and sophisticated tools to capture, prepare, analyze and manage generated data. In another word, they are not prepared to fully use the unprecedented amounts of data that they are able to collect for their unique target populations or the social issues they address.

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Also, there are several social challenges that social enterprises are aiming to address, be it environmental, education, and/or health problems, the innovations that can be drawn from data are limitless [23]. As for the concept of smart data, for example, integrating the approach towards social entrepreneurship brings out an initiative in reinforcing social values while using information as its core component [1].

The literature suggests that entrepreneurial orientation is a useful lens through which to consider the use of big data analytics in small enterprises. The two dimensions of entrepreneurial orientation, which point to the link between small enterprise and big data capabilities, are [16]:

- *Innovativeness:* Achieving social mission through innovativeness refers to the ability to solve social problems or in effect to create social value. This supports a contention that it will be a key indicator of whether social entrepreneurs will adopt big data analytics.
- *Proactiveness:* Proactive enterprises can make use of big data analytics to improve their understanding of their customer and their sector, with the condition that they have access to the right sources of information. It is, therefore, an important element to consider when looking at big data adoption in SSEs. For example, through retaining the environment, this reflects the tangible and intangible results of breaking patterns, changes in the system, and new discoveries towards process improvement.

So, SSEs have to examine how to exploit successfully the diverse and voluminous data and how to use the analytical techniques in order to accomplish their mission and support sustainable change.

B. Develop a Data-Driven Approach for SSEs

In order to succeed in an analytical approach and boost a big data project, it is necessary for social enterprises to prepare it in advance. To do this, three essential questions must be asked:

- *Why:* The first question to ask is "why? ". In most cases, this question will inevitably occur during the initial briefing with a consultant or client. Many big data projects are launched only because the term big data is in vogue. Many executives board the wagon and begin to approve massive investments of time and money to develop a data platform. Most of the time, this strategy is based entirely on the motive that *"everyone is doing it".* An in-depth analysis of the goal that a social enterprise wants to achieve, by analyzing the 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. But, many don't know which approach to tackling. What social enterprise is trying to do? Does the project objective creating an innovative market, or find a new channel that requires information on client interest and future profitability?
- *How:* While companies do see the great potential that big data analytics can bring to improve their business performance, the reality is that many are struggling to generate value from available data. Gartner [24] study shows that many big data projects remain blocked and that only 15% have been deployed in production. Examining such failures, it appears that the main factor is in fact not related to the technical dimension, but rather to the processes and human aspects that prove to be as important. Conduct a data-driven project means also to be able, in particular, to answer questions, such as: How can we be sure that big data could help us to create social 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 also important to ensure that the social project is progressing towards the intended result (as depicted in Fig. 1).

Small enterprise in the age of big data, must rely on varied analytical approaches to thought and action to create and implement solutions that are socially, environmentally, and economically sustainable. Being a data-driven in business, social or science sector means being at the heart of data valuing and intervene at all stages of the data value chain: problem definition, data collection, preparation, modeling and solution creation.

New analytics approach in big data age combines predictive and prescriptive analytics to predict what will happen and how to make it happen. Analytics uses and applications improve the efficiency of the decision-making process and generate value.

SSEs have to expand their efforts to move their small business from using only traditional business intelligence (BI) that addresses descriptive analysis (what happened) to advanced analytics, which complements by answering the "why", "what" and "how" questions.

Ultimately, 'data science' and the algorithm of machine learning are inevitable as they can help extract various kinds of knowledge from data, which can be referred to the social solutions.

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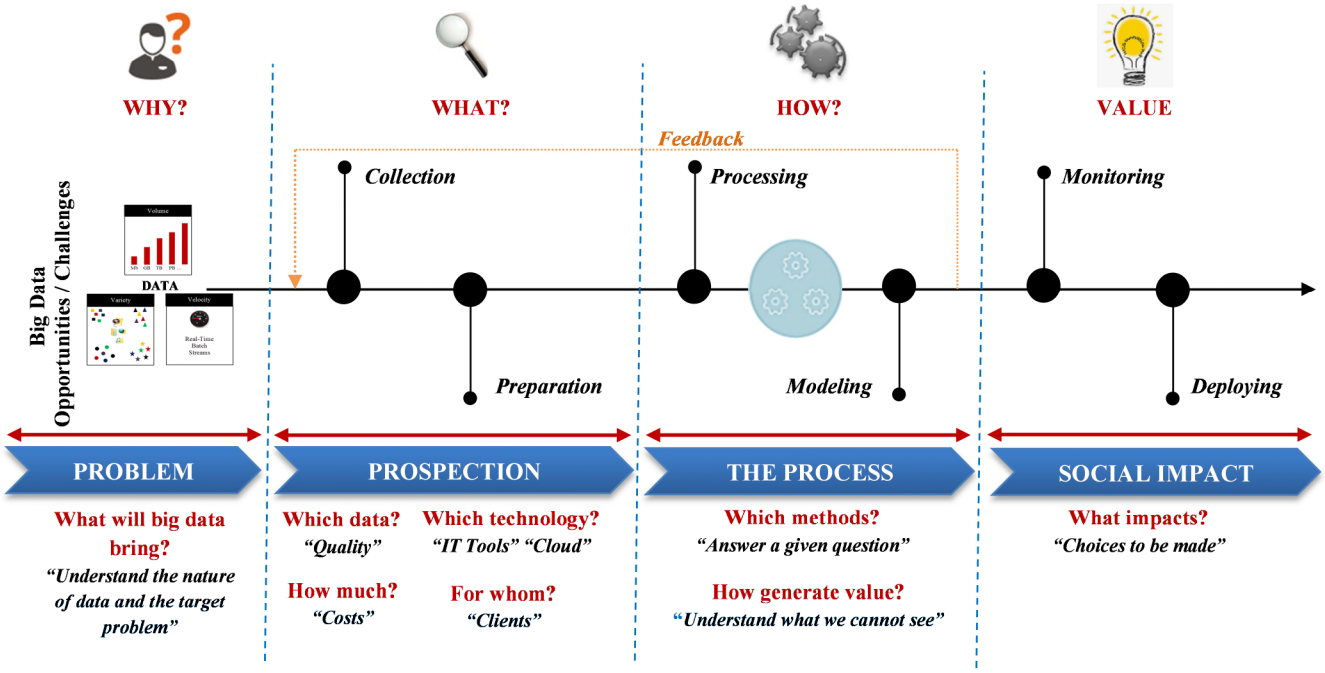

Figure 1. Data-driven approach for SSEs (create value from data)

SI is based on the power of data and analytics, which leads to the need for the exploitation of the data potential. The principle is that by analyzing, in real-time, the data collected by GPS, satellites, smartphones, social media … around the world, it is possible to identify trends, make connections and predictions. SSEs are leveraging the opportunities of big data universe and must create their own approach based on data analytics to better derive social impact [25][26].

V. DISCUSSION

Analytics widens SSEs scope as an entity, giving them the ability to do things they never thought were possible. For example, it offers timely insights, to allow them making better decisions, about SI opportunities; it also helps them to ask the right questions and supports them to extract the right answers as well.

Clearly, the use of big data analytics will provide numerous opportunities to build social approach based on data that will effectively and efficiently cater to the needs of the various entities. In this context, the United Nations Global Pulse has been created to harness digital data using analytics tools in order to understand changes in people well-being.

To improve decision-making processes in the choice of infrastructure, geolocation data are useful. In Senegal for example, a GSMA project has identified the most relevant trajectories for the construction of a road, in line with the data of journeys operated by mobile phone users. The data are also used to define maps of illiteracy rates. The same goes for Ebola, where the mobility of citizens is analyzed to anticipate population movements.

Also, in partnership with WHO (World Health Organization), the GSMA has addressed tuberculosis risks by using anonymous mapping data to measure disease peaks and predict people at higher risk [27]. The association is also tracking the resistant forms of malaria using anonymous data to identify the source and routes of transmission of this disease.

The 'Give Directly NGO' that provides direct donations to poor people in Africa, is now equipped with a poor village recognition algorithm based on an automatic analysis of Google Earth satellite imagery [5][28].

Also, 'Simpa Networks', an Indian social enterprise that rents out-of-use solar panels to households without access to electricity and donates them after a rental amount, has obtained a predictive model to identify, among its new customers, most likely to go through the rental process [29].

Many examples have shown that data-driven solutions have transformative impacts on SI. These examples have taken the importance of data from the power of its use and purpose rather than its volume. These enterprises have understood that it is the analytics process that can bring innovative and social benefits.

So, it is the data analysis that will extract all the value and especially allows developing a more detailed understanding of the uses. Powerful analytics tools can then be used to process the information gathered in large sets of structured, semistructured, and unstructured data.

Data analytics algorithms can provide teams with a deeper level of evidence so that they can better differentiate which activities have the greatest social impact and redesign their services accordingly.

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Be able to act effectively on diverse aspects of data analysis techniques and IT tools give SSEs the power to better adapt big data analytics to social needs.

Join the arena of data-driven to SI provides alight on several points, in this context, some initiatives should be stepped:

- Map out the demand in the social sector to identify the nature of issues and the solutions needs.
- Explore the social impact of big data, and identify mechanisms through which SI is achieved [30].
- Identify the existing social project in this field in order to have a clear vision about the opportunities and challenges and identify gaps to better draw their program.
- Preparing a solid IT infrastructure to meet the challenge and be more competitive in the SI context.
- Founding a strategy-based approach, which must be tailored to analytics practices and techniques in order to address issues and face social challenges, including practices in which they implement their own concepts for their entrepreneurial orientations.

The placement of these initiatives should be coordinated with the launch of the social entrepreneurial creative spaces and the pilot projects (where they could be employed). In this term, the SI ecosystem must be redesigned and updated through the integration of the factors and the needs to better draw the roadmap for SSEs to enable them to use big data and advanced analytics for social good towards the achievement of social change.

Therefore, the efforts should concentrate on creating a roadmap for success that covers several stages:

- Set up the entrepreneur's social issues direction (identifying its mission, vision and strategic and operational objectives).
- Establish policies, principles, resources and expertise guidelines to control ICT and big data usage.
- Evaluate and analyze the current situations and the necessary changes and additions to reach the desired result.
- Identify priorities and use them to determine the most important components and techniques that would offer the greatest social effects with the smallest investment.
- Realize new SI opportunities for further development by monitoring current analytics developments and their effects and the arising issues and new requirements.

SI often has a positive connotation associated with notions of openness, collaboration or inclusion, unlike other commercial innovations. Whether it takes the form of new practices, new measures, new programs or new policies, big data analytics will facilitate the appropriation and adaptation of social innovations, alleviating those apprehensions and will benefit the greatest number of people.

This innovation is placed at the intersection of three areas: innovation, social problems and digital technologies that increase the quantities of data. To launch a big data project, SSEs have to master the way it works (see Fig. 1). In this context, we propose two approaches [31]:

- *Bottom-Up Approach*: This approach goes from the bottom (the technique) to the top (the organization). With this approach, social enterprises will first validate the technical choices through a PoC and a case of use that they consider relevant. Once the project has been validated, they can continue with other experiments on ancillary domains (data analysis, visualization, etc.) or quickly realize a use case and bring value immediately. This organization is highly iterative both technically and functionally. This is obviously the method that brings the fastest results and can support enterprises' strategies; in contrast, its visibility is limited.
- *Top-Down Approach:* This approach will first impact the organization of the social enterprises to enable them to launch big data projects. They must define a big data strategy for their entire social objective, a schedule of implementation of the concrete objectives that often result in new offers for the company or the improvement of existing offers. With this approach, the concrete results are longer to obtain. In contrast, objectives, responsibilities, and sponsors are clearly identified.

From the several examples mentioned in this paper we can notice that big data analytics can meaningfully support social innovation across health, housing, education, employment, etc. But, it should be noticed that the exploration of the data alone will not solve major social problems. Financial and technological resources are also needed. Therefore, it is necessary to include enough resources and finance to support the analytics' uses by entrepreneurs for social good. This investment is essential to reap the full benefits of big data and realize all the envisioned features and capabilities.

The ability of social enterprises to adopt big data analytics may be understood by looking at their role in the determination of the data-driven culture and how they are deploying their resources to engage with and make use of analytics tools and methods in their field.

VI. CONCLUSION AND FUTURE WORK

To promote the SI process based on data analytics, specific attention will be paid to the SSEs that want engaging in this field. This is important because, it helps to understand their roles, their needs, the challenges they are dealing with, the social value they can generate, and their position in the SI ecosystem. Thus, it is needed to address the existing need for theoretical and methodological frameworks, which build on the different elements that iterate in the social construction of SI and account for its complexity and contextual dimensions [32].

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This paper addresses the importance of big data for small SSEs, without covering all the areas where data analytics may benefit the social innovation. It allows an understanding of the importance of big data for social sector and how these tools can revolutionize and help the SSEs to evaluate the efficiency of the social project in order to enhance their future directions.

This paper contributes to SI literature by creating a data-driven approach that can help the social enterprise to grow in unpreceded ways by harnessing the available data and understand the social needs and issues. This work paves the ground for developing a more mature data-driven approach, where real case studies are involved to test the efficiency of this approach in meeting various social impacts through a flexible data analytics process.

Future research should focus on data-driven SI, as this relates to the results and outcomes of data use, from generating innovative social solutions (products or service) to improving business and social efficiency. To better analyze the social impact of big data, more empirical studies are needed to understand more reasons for which social enterprises must integrate big data analytics in the SI ecosystem.

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