

HOW CAN BIG DATA AFFECT UNCERTAINTY IN STRATEGIC DECISION-MAKING?

A Theoretical Analysis

Master Thesis for MSc in International Marketing Aalborg University

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Abstract

Decision-making and uncertainty have been studied throughout the years, in various fields, in a quest to understand the human behavior, i.e. how decisions are processed. The recent years, have brought to the spotlight big data as a revolutionary solution to aid organizations in improving their decisions. As many companies are facing difficulties in retrieving value from big data technologies, it shows the importance of studying further this thematic. Therefore, this thesis focuses on investigating the role of big data tools in helping decision makers reduce uncertainty when facing strategic decisions.

The strategic decision and big data literature will be presented and combined in a literature review. Providing a comprehensive understanding on how the two issues can be interconnected, and the effects that one can have over the other. A critical theoretical analysis on the literature covered is used to find an alternative approach to the problem. The strategic decision-making process is analyzed to understand the uncertainty perceived in each stage of the process, to evaluate to which extent big data tools can be applied by managers through the decision-making process.

The analysis conducted reveals that there is the potential to reduce uncertainty within the strategic decision-making process. However, the analysis also revealed that the uncertainty intrinsic to the use of these technologies can influence the way managers make their choices. Therefore, a theoretical suggestion is made to evaluate the inclusion of big data in the organizations, in order to take advantage of the full potential that these tools can provide.

Key words: Big data, Big data technology, decision making, strategic decision making, uncertainty.

Table of Content

1.	Int	roduc	tion	1
	1.1.	Res	earch Context	1
	1.2.	Pro	blem Formulation and Research Questions	5
	1.3.	Proj	ect Outline	7
2.	Me	ethodo	ology	8
	2.1.	Met	hodological View	8
	2.1	.1.	Philosophy of Science	8
	2.2.	Res	earch Methods	12
	2.2	2.1.	Literature Selection	12
3.	Lite	eratur	e Review	16
	3.1.	Big	Data	16
	3.1	.1.	Definition	16
	3.1	.2.	Dimensions	18
	3.1	.3.	The Knowledge Creation Process	19
	3.1	.4.	Opportunities	22
	3.1	.5.	Challenges	25
	3.2.	Stra	tegic Decision-making	30
	3.2	2.1.	Decision-making	30
	3.2	2.2.	Strategic Decision-making	33
	3.2	2.3.	Strategic Decision-making Process	34
	3.2	2.4.	Decision-making Under Uncertainty	39
	3.2	2.5.	Uncertainty in International Marketing Strategic Decision-making	45
	3.2	2.6.	Information Technology in Strategic Decision-making	49
4.	An	alysis	of the Theoretical Findings	53
	4.1.	Stra	tegic Decision-making Process and Uncertainty	53
	4.2.	Red	ucing Uncertainty in Strategic Decision-making Process Through Big Data	57
	4.3.	Unc	ertainty Intrinsic to the Use of Big Data Tools	60
	4.4.	The	oretical Framework	64
5.	Dis	cussic	on	66
	5.1.	Prac	ctical implications and recommendations	66
	5.2.	Lim	itations	67
	5.3.	Furt	her Research	67
	5.3	8.1.	Primary Data Collection – Interview Methods and Design	68
6.	Со	nclusi	on	72

е	5.1 .	Conclusion	72
е	i.2.	Contribution of the Research	73
7.	Refe	erences	75
8.	Арр	endix	83

List of Figures

Fig. 1 - Data Creation Evolution (Source: IDC's Data Age 2025 study, 2017)
Fig. 2 - Structure of the Research (Source: own creation)7
Fig. 3 - Subjective/objective dimensions (Source: Morgan (1979), Kuada (2012))
Fig. 4 - RRIF Classification (Burrell & Morgan, 1979)11
Fig. 5 - KDD process (Source: Fayyad, Piatetsky-Shapiro, & Smyth (1996))
Fig. 6 - Strategic Decision-making Phases (Source: Charles R. Schwenk, (1995); Mintzberg et al.,
(1976))
Fig. 7 - Strategic decision-making process (Source: Shrivastava & Grant, 1985)
Fig. 8 - Strategic Decision-making Process and relation to the environment (Source: adapted
from Harrison (1996))
Fig. 9 - Nature of Uncertainty (Source: Own creation based on Bell, David E.; Raiffa, Howard;
Tversky (1988), Dosi & Egidi (1991),and Lipshitz & Strauss (1997))42
Fig. 10 - Environmental Uncertainty (Source: Own creation based on Milliken (1987) theory). 44
Fig. 11 - Nature of Uncertainty and Uncertainty Sources (Source: Own Creation)
Fig. 12 - Strategic Decision-making Process and relation with the environment (Source: adapted
from Harrison (1996))
Fig. 13 - Big Data Tool in Strategic Decision-making Framework (Source: Own Creation) 64

List of Tables

Table 1 – Main benefits of using Big Data (Source: own creation, adapted from Akter & Wamba,
2016; Manyika et al., 2011)
Table 2 - Uncertainty in International Markets (Source: adaptation of Miller (1992))
Table 3 - Benefits of using information technology in strategic decision-making (Source: own
creation)
Table 4 . Strategic Decision Process Uncertainty (Source: Own Creation)
Table 5 – Uncertainty from using Big Data Tools (Source: Own Creation)

1. Introduction

This section provides the justification for the topic choice, namely by discussing its' relevance on nowadays business activities, and international marketing. Furthermore, research questions will be defined to shape the project, allowing it to better answer the proposed problem.

1.1. Research Context

Globalization

Globalization is a phenomenon that has been present throughout the years, having an increasing influence on worlds' societies in the past recent decades (Cuterela, 2012; Mitrović & Stefanović, 2007). There are several interpretations and definitions for this occurrence, since it can be analyzed through different perspectives, and presents itself as a, constantly evolving topic. Nonetheless, it can be characterized as a process that increases interaction between players located in different parts of the planet, by shortening the distances and moving things closer, with the purpose to create mutual benefits (Larsson, 2001).

The term is often connected to the evolution of technology, that promotes communications and connections throughout the globe, bringing people and entities nearer (Cuterela, 2012). This evolution helps to create a world that is apparently smaller, due to the ease at which people can exchange of information.

From the business perspective, living in a world where globalization is a reality, makes it an unavoidable issue for todays' companies. There is no longer the possibility to overlook the phenomenon and to ignore the impact that the international players have, since nowadays most companies are affected and/or influenced by the global competition, reinforced by the effects of globalization (Kotler & Armstrong, 2011).

Companies need to address and work with this new reality, accepting the intrinsic challenges that may have to be addressed in new ways. From the perspective of firms, this phenomenon can be looked at from two angles: opportunity or a threat. Such dichotomy arises from the fact that, the interaction between international players and their presence in foreign markets, can cause radical changes on the business environment. This shift can make business to be more open to the benefits emerging from international trade, but at the same time new adversities natural to the more complex environment may appear (Dzaleva, 2009).

According to Kotler & Armstrong (2011), the ones that can comprehend and adapt better to the new characteristics of the marketing environment can be successful, the ones that do not, may risk their existence.

In this context, of a growing globalization where new players bring different methods of doing business, it is natural to observe a growing number of companies that are or would like to be operating in markets outside their countries boarders. The higher complexity and multidimensionality are two characteristics that distinguish working in a domestic market from doing business in an international level (Doole & Lowe, 2008).

In the presence of such variables, namely, a multitude of actors, the constant change of the working environment and how all these are influenced by globalization, lead to an analysis on how this affects the ones behind the decision within a international marketing.

Therefore, this paper emphasizes the difficulties that managers encounter when making decisions in environments that are characterized by the lack of certainty. Focusing on the challenges outcoming from those decisions, to evaluate big data as tool to assist decision makers on their strategic decisions. Considering the difficulties faced by organizations making decisions in foreign, uncertain markets, this project proposes to analyze the potential big data technologies have in helping managers to deal with uncertainty in their strategic decisions.

Decision-making under Uncertainty

One of the main obstacles that companies face when internationalizing their businesses, is how to gather, treat and use information. Typically, information about foreign markets is limited, lacking objectivity and quality (Cavusgil & Godiwalla, 1982). These circumstances create severe obstacles to companies that often have to deal with lack of knowledge and uncertainty. More directly, this environment affects the managers dealing with international marketing decisions, that often have to make choices based on subjective and perceptual factors (Cavusgil & Godiwalla, 1982).

Although managers' decisions are affected by numerous variables connected to personality traits and the environment characteristics, uncertainty is frequently considered a key variable in international decision-making (Aharoni, Tihanyi, & Connelly, 2011).

Uncertainty is a concept that is connected to the perception of knowledge or the lack of it, that a person has about a certain question or topic. An individual can be considered uncertain if he or she lacks confidence about his/her knowledge on a certain topic. Uncertainty can be viewed more as a scale between certainty and lack of knowledge, than a dichotomy (Sigel, Klauer, & Pahl-Wostl, 2009).

Considering that absolute knowledge is impossible to achieve, business decisions are hardly exempt from uncertainty. Decision-makers have to balance what they know with what they do

not know, on a probability assessment, to try to reach an optimal decision (Damghani, Taghavifard, & Moghaddam, 2009).

Therefore, a severe challenge that managers face, is the fact that decisions within the international marketing sphere are made with an absence of relevant information. This leads to a constant state of uncertainty, making it a process characterized by the presence of less rational decisions (Damghani et al., 2009; Johanson & Vahlne, 1977).

When companies decide to internationalize their businesses, it embodies a "major change in the scope and the character of its product-market and organization environment relationships" (Cavusgil & Godiwalla, 1982, p. 47), which characterizes a strategic decision making. So, it means that managers face strategic decisions from the beginning of the internationalization process, and this and other strategic decisions are considered more difficult to make, considering the higher environmental uncertainty (Cavusgil & Godiwalla, 1982).

This study is particularly relevant for decision makers operating in especially complex and uncertain environments, such as international markets, considering the main purpose of the research, which is: to study big data as a potential tool to aid managers in dealing with the uncertainty present in strategic decision making. More than presenting big data technologies as the perfect solution to decision-making problems, that managers face, this paper focus is to question the role that big data has on reducing uncertainty present in these decisions.

Big Data

Data has also changed through time, so companies need to learn and understand how to select, treat and use it, in order to transform it into knowledge, making it helpful to their decisions.

Collecting and using the available data is a struggle and at the same time an opportunity for every business throughout time. With the technological progress, data grows at a higher velocity than ever before. This increasing velocity of data creation is mostly a consequence of the digitalization of the information. This was a process that has seen an exceptional evolution, going from 25% of the world's stored data being digital in 2000, to 98% in 2016 (Xu, Frankwick, & Ramirez, 2016). With the use of technological gadgets such as, smartphones and computers, people are constantly creating data without noticing.

As it is possible to observe in the following figure, data has seen a tremendous growth in the past years, and will have the tendency to grow at a higher rate in the upcoming years (Reinsel, Gantz, & Rydning, 2017):

3





Combining this evolution with the fact that data storage capabilities are increasingly improving, and becoming more affordable, makes it a key topic for businesses that want to succeed on todays' market. However, this development, also brings some challenges for the companies. Among those, we can find the necessity to turn the data in its' immense size, characterized by a high pathed growth and changing characteristics, into useful insight to support the decisionmaking in the organizations (Amado, Cortez, Rita, & Moro, 2018).

Since data has always been present on human activities throughout the years, one could question why this theme is still considered new and more relevant now than before. In fact, companies have been using data to support their decisions for decades now. However, before, data was normally generated by the businesses in a way that they knew how to use (for example in the form of surveys or interviews). Now, there is a volume, velocity and variety in the data that has never been seen before, which require special tools to translate it into insightful information for businesses (Erevelles, Fukawa, & Swayne, 2016). To transform big data, into valuable knowledge for companies, the new methods need to capture, process, analyze and visualize the data in big quantities within a controlled time span. (Amado et al., 2018; Erevelles et al., 2016).

Businesses have now the opportunity to know and understand better the consumers. If companies succeed to retrieve the correct and advantageous information from the data, they can support their decisions on it, and create their marketing strategies based on this information. If companies manage to incorporate these methods and tools into their businesses, it is expected that they can create sustainable competitive advantage, through the improvement of the decision making (Erevelles et al., 2016; EYGM, Ke, & Peng, 2014).

According to Schutz (2017), the companies' priorities when using the data is to increase revenue and to better serve the customers. This means that when choosing to face the challenges of big data, companies expect to provide a better service to consumers and increase their profits. Considering the possibilities that big data can give to businesses and the potential insight on the consumers and markets where they operate, it is logical the interest that companies have been showing in this subject. Namely, when operating in international markets, where uncertainty is typically higher, due to the complexity of the environments, and the absence of relevant data. Big data is often viewed as the perfect solution to help decision makers on theirs tasks. There is a popular idea, that by using analytics on big data, firms can create a stronger foundation for making better, faster, evidence supported and less uncertain decisions (Ghasemaghaei, Ebrahimi, & Hassanein, 2018; Giest, 2016; Košcielniak & Puto, 2015).

Although there is a growing interest in the Big Data, there is still an ongoing gap on the management research regarding this topic. It is considered that there is the need for further developments in the theoretical constructs and on the comprehensive analysis of the challenges and opportunities presented by this new reality (Sivarajah, Kamal, Irani, & Weerakkody, 2017). Therefore, this paper aims to contribute to the development of this theme, by having a theoretical approach to study if big data is truly able to aid the decision makers in coping with uncertainty, and help them to make better decisions.

1.2. Problem Formulation and Research Questions

This paper aims to analyze the problematics that managers face when operating in uncertain conditions, using the decision-making perspective, to analyze how could big data be useful in solving the uncertainty problem in strategic decision making. As it can be viewed as one of the biggest constrains in when making decisions. This should provide an understanding about the variables that researchers have been considering for evaluating the strategic decision-making problem and to comprehend how companies should use big data. This study is particularly relevant for managers making strategic decisions concerning international markets, considering the particular uncertain context where the decision is made.

Following the previously explained research context, the following problem was formulated:

"How can big data affect uncertainty in strategic decision-making?"

This papers' aims to reach four major objectives:

- Investigate the big data benefits and challenges.
- Explore the strategic decision-making process.
- Understand how uncertainty affects the strategic decision-making process.
- Analyze the role of big date in reducing uncertainty for strategic decision-making.

To help in the further analyzes of this problem, four research questions were developed:

1. What is the potential of big data?

This question should be answer by reviewing the relevant literature about big data, to allow an assessment of the possibilities and challenges for businesses using or intending to use big data tools.

2. How decision makers conduct their strategic decisions?

The literature review will integrate relevant theories to provide a comprehensive understanding on the way decision makers behave when facing those decisions.

3. How does uncertainty affect strategic decision-making in international marketing? The literature review provides an understanding on how uncertainty is present on strategic decision-making, and how the international environment affects uncertainty. Furthermore, the analysis will critically analyze how the uncertainty affects the strategic decision-making process.

4. What can be the role of big data in reducing uncertainty in strategic decision-making? The theoretical analysis should provide a critical evaluation on the way big data tools can be used to reduce uncertainty and how can organizations take advantage of these tools' potential.

1.3. Project Outline



Fig. 2 - Structure of the Research (Source: own creation)

This project follows the illustrated structure. The literature review aims to help in the response to the research question by covering relevant literature on the big data topic and strategic decision-making. Permitting, on one hand, a better understanding of the foundation of big data and its' potential and challenges. On the other hand, a comprehensive understanding of the strategic decision theme will be developed, with a focus on the process and role of uncertainty. The literature review should allow the comprehension on how the topics can be interconnected.

The theoretical analysis should focus on addressing the voids identified, by critically analyzing the literature and propose solutions to the identified problems. Contributing to the topic debate by giving a different perspective on how big data can be used in the strategic decision making process.

The discussion reflects on the role of this research, and the factors influencing 6ye development of the project, with suggestions for future studies on this thematic.

The conclusion assess how the thesis was able to answer the research questions, and the contribution to the knowledge creation in the field.

2. Methodology

This section of the project will provide an explanation on how the research methodological positioning, and describe methods used to collect the selected literature.

2.1. Methodological View

Researches in social sciences are influenced by the researchers' root assumptions about social reality and values, explicitly or implicitly (Kuada, 2012). Therefore, it is considered useful, for a better comprehension of the research, that the authors' reflection on philosophy of science is explored in the project. Providing an analyzes on methods, data and reporting procedures used to conduct the research, considering the researchers' reality view (Bryman & Bell, 2015; Kuada, 2012).

The methodology chapter offers the reader a logical sequence, as explained and introduced by Kuada (2012). Beginning with a philosophical discussion on the existing theories of science or ontologies that explain the reality grounding this project. The second step, explores the believes about the knowledge creation, by introducing an epistemological argumentation. The next stage contains the methodological decisions, presenting the reasonings for the methods that are used throughout the project.

By discussing the philosophy of science, one can better explain the choices made throughout the project and ultimately choose the methods that best suit the present research.

2.1.1. Philosophy of Science

The assumptions on which researchers base their world views, values or believes are identified as paradigms (Cibangu, 2010), which justify the preferences and decisions made throughout the project. Paradigms are often used to help researchers classifying their choices by providing a framework, where one can position him/herself. When taking a position on the social sciences paradigms, typically make the distinction between objective and subjective approaches to research, in order to classify their view inside the proposed paradigm (Kuada, 2012).

A classical paradigmatic classification, used to differentiate the metatheoretical assumptions taken by researchers was introduced by Burrell & Morgan (1979), dividing the root assumptions into four dimensions. Ontology, that refers to the individuals' assumptions about human beings and their relation with the social world, defining the view about reality perception. Epistemology, places the researchers in terms of the nature of knowledge. Human nature, is the

dimension that reflects on the interaction humans have with their environment. Finally, methodology, discusses the research design by arguing the choices and method used. Burrell & Morgan (1979), used the objective/subjective distinction to categorize the different metatheoretical dimensions:

Dimensions	Objectivist Approach	Subjectivist Approach
Ontology	Realism	Nominalism
Epistemology	Positivism	Anti-positivism
Human Nature	Determinism	Voluntarism
Methodology	Nomothetic	Ideographic

Fig. 3 - Subjective/objective dimensions (Source: Morgan (1979), Kuada (2012))

For this research, the methodology dimension will not be included in the discussion, considering that no data was collected for the elaboration of this research.

2.1.1.1. Ontological Reflection

The ontological discussion, offers the researchers the possibility to place themselves on the nominalism-realism debate.

The realism view point, understands the social world as a real existence, independent of the human awareness and consciousness. Interpreting the world as an independent, tangible, immutable structure that is given to the individuals, and not a human construct (Burrell & Morgan, 1979; Kuada, 2012). On the other hand, nominalism interprets reality as a subjective creation of the individuals, sourced in the human cognitive capabilities when interacting with others. This interpretation of reality defends that the world only exists in the mind of the individuals, assuming that reality may change according to social constructs as language and culture, leading to multiple realities present in social science (Burrell & Morgan, 1979; Gibson, 2016; Kuada, 2012).

The present research approach in the ontological dimension, cannot be fully explained by neither by realism nor nominalism. This means that the decision maker is considered to have the perception of social reality as being tangible although it can be affected by human cognition and perspective. Consequently, the decision maker views the decisions as part of a real existence world, but this reality may be subject of human interpretations, where uncertainty is present.

2.1.1.2. Epistemological Reflection

With a rather subjective approach of these research, in the epistemological dimension, this research can be positioned as being anti-positivistic, regarding the nature of knowledge and how this knowledge is assimilated. Meaning that the idea proposed by the positivism, that all knowledge can be objective and the truth is social world is a singularity that can be obtained in the same way by an external observer, is refused (Bryman & Bell, 2011).

Aligned with the understanding of the world as a social construct, it is considered that the decision maker interpretation of the realty is necessary, as an actor of the social world (Burrell & Morgan, 1979; Kuada, 2012). For this research purpose, it is considered necessary to be present in decision-making process, to be able to perceive the characteristics of that specific reality.

Considering the purpose of this paper, to analyze the decision-makers' perspective to evaluate big data as a tool to aid in the decision-making process, it is crucial to structure the research using the viewpoint of the person making the decision. Although the project does not comprise a first-person experience, by decision makers, the research purposes theoretically analyze the impact of big data in strategic decision-making. Therefore, it is indispensable to consider the direct role of the individuals on the creation of knowledge for this paper, as the aim is to help the decision-making process to improve.

2.1.1.3. Human Nature Reflection

Regarding the human nature dimension, this research also follows a rather subjective approach, although it does not fully adopt the voluntarism approach. Taking into account that the project lies on the capacity of individuals to make decisions, the deterministic point of view cannot be fully considered in this paper, that the environment defines the human actions, being this actions determined and predictable by it (Burrell & Morgan, 1979).

On the other hand, the voluntarism approach is also is not fully suitable to describe the adopted research approach, even though it is presents characteristic that are more similar to the present research vision of reality. The original voluntaristic perspective interprets individuals as completely autonomous and free-willed on their activities, being completely independent from the environment where they are inserted (Burrell & Morgan, 1979; Kuada, 2012).

Burrell & Morgan (1979) defends that is possible to assume an intermediate stand point regarding human nature, by retrieving features from both approaches. As such, the present research takes an intermediate viewpoint, since the decision maker is view as a free-willed

individual, and with the capability to make choices. However, at the same time, it is considered that the decision-making process is influenced by environmental factors, so it cannot be completely dissociated from the external aspects. The environment is considered to impact choices, although it does not define the human actions.

2.1.1.5. Positioning on the RRIF Classification

Burrell & Morgan (1979), further developed the typology of the paradigms from the subjective and objective discussion, by presenting two new assumptions to the description of the paradigms. This classification is aligned with the view of the world adjacent to this project. Introducing the distinction between "sociology of regulation" and "sociology of radical change". The regulatory perspective, focuses on explaining the equilibrium in society and the nature of the social order. On the other end of the spectrum, radical change refers to the problems outcoming from change, coercion and conflict in human interactions. The previously mentioned differentiation resulted in a two dimensional matrix, that is considered one of the most popular classifications within the business economic field (Kuada, 2012):



Fig. 4 - RRIF Classification (Burrell & Morgan, 1979)

These four dimensions are considered to have three main purposes, being the first to aid the researchers on their quest to clarify their conventions about the nature of science and society. The second purpose is to allow the researchers to understand the work made by others. And the last objective is to help researchers defining their research path (Saunders, Lewis, & Thornhill, 2008).

The Radical Humanist dimension, is the positioned under the subjective and radical change dimensions, sustaining the assumption that reality is a social construct. Thus, stressing the

human interactions in the world considering it as an external phenomenom. The individual emancipation from society is considered as source of power for social changes (Burrell & Morgan, 1979; Kuada, 2012).

Radical Structuralism, focuses on societal structural conflicts. Interprets social reality as being based on objective structures. This structures within society are considered relevant, since they need to be understood and criticized in order to operate necessary fundamental changes. Defending an analysis of the phenomena based on power relationships and patterns of conflict (Burrell & Morgan, 1979; Kuada, 2012; Saunders et al., 2008).

The Functionalist paradigm, refers to the contribution that individuals have to the system. It offers a rational explanation for the occurrence of a phenomenon, accepting society as a real and concrete, and aiming for order and regulation (Burrell & Morgan, 1979; Kuada, 2012).

Interpretive paradigm, is characterized to be subjective and qualitative. It interprets social actions as happening in complex contexts where ambiguity is present, focusing more on the experiences of the humans, rather than the outcome (Burrell & Morgan, 1979; Kuada, 2012).

For this project, the interpretive paradigm, is the one that best characterizes the research approach, analyzing experiences in a subjective manner, such as the decision-making process. Aiming to analyze the decision makers in a social context, identifying their role in the social world as being singular, and recognizing the complexity of the environment where they are inserted. The interpretation of the decision maker reflects the human being with a self-interpretation of the international market, and the variables included in the decision process in that specific context. The approach, may allow a valuable insight into how the decision maker processes choices, providing an understanding to how the environment impacts this phenomenon.

2.2. Research Methods

2.2.1. Literature Selection

The presence of a literature review in a paper, can be explained by the need of the researcher *"to understand the literature before shaping an argument or justification"* (Danson & Arshad, 2014, p. 37). In fact, according to Bryman & Bell (2011), providing a literature review can have benefits such as, creating the foundations for the research questions that are aimed to be answered and create a research design; provide a space where the researcher is able to explain how the knowledge was achieved and how the data was processed. Finally, allows the

researcher to see the work that was already conducted in the field that is being analyzed, enabling, in that way, the researcher to look at possible aspects that still need to be covered (Bryman & Bell, 2011).

However, even in the realm of the literature review, it is possible to elaborate it in different ways (Bryman & Bell, 2011; Danson & Arshad, 2014). The common distinction available, regarding the way of conducting a literature review, is between traditional (or narrative) literature review and systematic literature review (Danson & Arshad, 2014).

There are differences between engaging in each type of literature review, traditional or systematic. According to Jesson, Matheson, & Lacey (2011) and Danson & Arshad (2014), the main difference is, that traditional review aim is to recognize inconsistencies, new search streams or discover the existence of possible vacuums through a comprehensive analysis of the literature. On the other hand, systematic literature review focus is to simply collect substantial information in order to provide an answer to a specific and structured issues, through a more rigorous approach.

In addition to this distinction, made upon the aim of the researcher, Bell and Bryman also underline that the decision between one type of literature review can be also influenced by the approach given to the research applied to the paper in question (Bryman & Bell, 2011).

Traditional literature review was the chosen alternative, considering the purpose of this project: to select, combine, summarize and critically analyze the existent literature, without the defining a specific structured research question as basis. In summary, the decision to elaborate a literature review through the narrative style, in this paper, can be justified by the following features (Cronin, Ryan and Coughlan, 2008; Jesson et, 2011):

- Gives the researcher the possibility to collect literature while at the same time provide a critical perspective;
- Identification of research gaps;
- Non-specific method, making it valuable when conducting studies that incorporate higher number of problems and issues.
- It is more dependent on the researchers' behavior.

Additionally, the traditional narrative literature review may avoid the non-inclusion of relevant literature, that can happen through the standardized elimination process of the systematic literature review (Jesson et al., 2011).

As any literature research, in this project, the first stage was the search of literature. This search was done by using the online databases Google Scholar and Aalborg University Library. In the university library the searches were conducted using the peer review filter, English language, and year selection when considered relevant. In Google Scholar less filters are available, therefore, only the year was selected when applicable. Considering the project was based on the combination of two vast research streams, big data and strategic decision-making, the search could not be conducted only using the combination of both terms. Therefore, separate searches were also conducted on each topic to allow a better understanding of both themes.

When searching on the Big data topic and considering the novelty and the changes on the conception of big data overtime, the search focused on literature from 2010 onwards, although articles were included previous to 2010 due to backward referencing. On the searches about strategic decision-making, the date period considered was broader, to allow a deeper understanding about basilar theories, included in older literature.

For the present literature review, these were the search words used:

- Big data and/or: tools, analytics, technology, decision, marketing, knowledge, insight, intelligence, role, benefits, uncertainty, benefits, challenges, method, definition, learn, integrate.
- Decision-making and/or: choice, selection, big data, data, information, insight, strategy, process, method, definition, concept, system, analytics, model, stages, phases, effective, efficient, knowledge, cognitive, organization, management, international, business, marketing, risk, uncertainty.
- Strategic Decision-making and/or: big data, data, information, insight, process, method, definition, concept, system, analytics, model, stages, phases, effective, efficient, knowledge, cognitive, organization, management, international, business, marketing, risk, uncertainty.
- Uncertainty and/or: decision, decision-making, model, data, information, knowledge, manage, management, cope, strategy, environment, reduction, diminution, international, conditions.
- Information technology and/or: decision, strategy, decision-making, strategic decisionmaking, benefits, aid, value, business decision, marketing, risk, uncertainty.

 Knowledge creation and/or: data, big data, information, technology, decision, process, method, strategy, process, method, definition, concept, system, analytics, model, stages, phases.

Overall the literature selected for the inclusion in the literature review, resumed in 82 documents, from which, 23 focused on big data and 51 on decision-making related topics. Furthermore, 8 articles were found that covered directly both topics (see Appendix A). Form the literature selected, there were documents considered to apply a more functionalistic paradigm, or a rather interpretive approach, none was associated with the radical structuralism or radical humanist positioning. Although it can be seen as conflicting, the combination of both approaches can provide a more comprehensive understanding of the topic being studied (Friel, 2017). Therefore, there were no selection performed on that basis.

3. Literature Review

In this section, the literature selected is used to provide a comprehensive understanding about the topics, Big Data and Strategic Decision Making. Allowing an overview of the main issues in both areas, to support a reflection on how they can be combined and to identify eventual gaps in the literature.

3.1. Big Data

3.1.1. Definition

Big data is a topic that has created a significant wave of enthusiasm and curiosity from the public, businesses, researchers and press. Such wave can be justified by the expectation on the potential value that big data technologies can brig to the companies (Akter & Wamba, 2016). The growing interest from diverse fields, that attempt to understand and explore this concept, turned its definition unclear, and even contradicting (Ward & Barker, 2013). The novelty of this topic, is seen as one of the reasons why the definitions and classifications of big data have not yet reached a consensus among researchers. (Sivarajah et al., 2017).

The fact that firms have been dealing with data to create insight, actually means that this problematic is not entirely new, implicating at the same time, a completely different approach (Ward & Barker, 2013). The lack of harmony in the field lead to some misconceptions, that may be dangerous when companies engage in exploring big data. Consequently, managers have experienced difficulties in understanding the concept and distinguishing between what is big data, and what is big data doing (Gandomi & Haider, 2015). Therefore, it is important to explore the definitions and features attributed by researchers, in an attempt to conceptualize this topic. By analyzing the characteristics attributed to this topic, one expects to clarify what is big data, highlighting the differences from previously used data, and build the basis for reaching further conclusions on the topic.

The problem with defining big data, besides the lack of consensus, arises from the lack of awareness that researchers and non-academics have about the meaning of the concept. Most of the studies rather focus on the phenomenon, ignoring its meaning (Diebold, 2012; Košcielniak & Puto, 2015). Another problem with the conceptualization of the theme, is the constant evolution of what is considered big data. Since, there has been references to the phenomenon prior to 2000's, the meaning of what was considered "big", has suffered an evolution until nowadays. As size has been always a variable connected to the conceptualization of the topic, some confusion has been created around this dimension. Namely due to different

interpretations and to the constant evolution of data (Gandomi & Haider, 2015). For example, the size of data that is considered to define this concept has seen a drastic change, from 50kb being considered "big" a few decades ago, to 200GB being considered small nowadays (Diebold, 2012). Actually, enhancing the magnitude of the data, and how organizations need to adapt to the new data reality is considered a popular way to attempt to provide a definition of big data (De Mauro, Greco, & Grimaldi, 2015). A good example of this approach, to define the topic, is by enhancing the size of the information involved, was provided by Goes (2007, p.3): *"ever-increasing creation of massive amounts of data through an extensive array of several new data generating sources"*.

An example that provides a definition by pointing a need for change was provided by Fisher, DeLine, Czerwinski, & Drucker (2012, p.53): *"data that cannot be handled and processed in a straightforward manner"*.

Chen, Chiang, & Storey (2012, p. 1166), combined the data magnitude, with the need to adjust to the amount and complexity of the data: *"the data sets and analytical techniques in applications that are so large (from terabytes to exabytes) and complex (from sensor to social media data) that they require advanced and unique data storage, management, analysis, and visualization technologies"*.

Although the data size is the aspect that most associate with the big data notion, other dimensions have been linked to the definition of the topic. In an attempt to provide a better conceptualization, Laney (2001) is viewed as the author that introduced the concept of the three V's, identifying three main characteristics that are commonly used to distinguish Big Data: volume, velocity and variety (Košcielniak & Puto, 2015). These dimensions have been considered the ground work for defining big data, and has been used in further developments of theoretical frameworks aiming to explain the phenomenon (Gandomi & Haider, 2015). Thus, one of the most known ways to provide a definition, is by using the characteristics of big data as a description of the concept (De Mauro et al., 2015). Oracle (2012, p. 3) addresses volume, velocity, variety and value as the *"four key characteristics that define big data"*

Another common way to describe this concept is by referring to the effects that big data has on society (De Mauro et al., 2015). Mayer-Schönberger & Cukier (2013), present a more societal approach to the description, defending that big data presents a shift on how one analyzes information, transforming the perception and organization of the society.

Although there is no consensus in the literature, and even several approaches try to define big data, De Mauro et al. (2015), have combined in their conceptual paper, the most relevant views

of this concept, reaching a definition that aims to comprise the major lines of thought. Which is accepted as a valid description on this research:

"Big data represents the information assets characterized by such a high volume, velocity and variety to require specific technology and analytical Methods for its transformation into value."

3.1.2. Dimensions

Besides the constant struggle to define Big Data, identifying and understanding the dimensions that distinguish big data, is an issue frequently addressed on the field literature. As introduced previously, some authors even used the characteristics to describe the concept. Laney's (2001) three V's (volume, velocity and variety) are considered the most common way to define the characteristics of big data. Furthermore, different authors have identified other characteristics, that are seen as core dimensions to identify big data. Some base their ideas on the three V's theory (e.g. Gandomi & Haider, 2015; McAfee & Brynjolfsson, 2012; Russom, 2011). Other researchers view big data in the same way, but identify one extra dimension to the main characteristics, intruding in that line of thinking, the four V's: volume, velocity, variety and value (e.g. Košcielniak & Puto, 2015; Oracle, 2012). Others point to more drastic differences to the original theory, but most researches seem to have the same basis on the dimensions analysis. The level of evolution in the interpretation of this topic's characteristics is high, with other dimensions as veracity (e.g. White, 2012), variability and complexity (Katal, Wazid, & Goudar, 2013) being considered as factors that are connected to the big data concept.

Although, there are many interpretations on which are the primary dimensions that characterize big data, most researchers see the original three V's, volume, velocity and variety as the main characteristics (Ghasemaghaei et al., 2018; McAfee & Brynjolfsson, 2012; Russom, 2011). Therefore, this analysis will mainly focus on the original proposed dimensions.

Volume refers to the vast quantity of data that is now available, and continually increasing (Akter & Wamba, 2016). This vast amount of information presents a specific set of challenges that organizations have to face. Namely in retrieving, processing, integrating, and inferring of such an amount of data (Sivarajah et al., 2017). There is no exact volume that defines big data, since it is also dependent on other variables, such as time. The volume of data to be considered as big, needs to consider the storage capabilities at a specific point in time and technology available. This consideration has its reasons, since what is considered big today, refers to the

current storage capability. With time and technological advancements, this reality may change (Gandomi & Haider, 2015; Russom, 2011).

The dimension variety, is connected to the different sources and formats on which data is captured and presented to the organizations (Akter & Wamba, 2016; Ghasemaghaei et al., 2018; Russom, 2011). With the technological advancements, companies deal with information varying from structured (tabular data as numbers, dates), semi-structured (e.g. Extensible Markup Language) and unstructured data (e.g. video, pictures, social media data) (Ghasemaghaei et al., 2018). This presents new challenges, since not only the volume is massive, but the data in not consistent. Being captured from dissimilar sources, formats and quality, increasing the difficulty to comprehend and manage this data (Sivarajah et al., 2017).

Velocity, is the characteristic denoting speed of data creation, the procedures needed to analyze and process these information at a fast pace (Gandomi & Haider, 2015; Sivarajah et al., 2017). Big data is connected to the speed features, aiming to have a higher process velocity of the system leading to a more up-to-date information. Ultimately, real time connection to information (Goes, 2007). This may also present complications to the organizations. Namely, to adapt to the new velocity of data, in order to retrieve value from having information available at a faster pace (Gandomi & Haider, 2015).

From the different characteristics introduced after the original three V's, one can state that value is the characteristic related to the capacity of retrieving knowledge or insight from the data available (Akter & Wamba, 2016; Katal et al., 2013). Veracity is the dimension highlighting the relevance of quality of the information and is related to the trustworthiness of data and its sources (Ghasemaghaei et al., 2018; White, 2012). Variability, corresponds to the differences in the flows at which data arrives to the organization (Ghasemaghaei et al., 2018; Sivarajah et al., 2017). Complexity refers to the difficulty to establish connections and linkage between data from different formats and sources (Katal et al., 2013).

More characteristics could be identified to characterized big data, but for this project, the original three V's are viewed as a general classification of the big data dimensions, comprising more implicitly or explicitly the other proposed characteristics.

3.1.3. The Knowledge Creation Process

Big data per se is empty of value, considering that the information that it contains, needs to be selected and treated in a way that generates value to the company (Gandomi & Haider, 2015).

With the specificities presented by big data, namely volume and variety, managers can expect to generate superior insight for their businesses. However, that is only possible if they achieve a practical way to handle the data, translating it, into meaningful knowledge. Furthermore, the use of big data also generates some intricate problems, such as storage and process difficulties. Managers need to address these obstacles, in order to produce relevant insight from this data, for their organizations (Economist Intelligence Unit, 2014).

An important distinction should be made, regarding information, data and knowledge. Hoffmann (1980, p. 293) defines information as: *"Information is an aggregate (collection accumulation) of statements, of facts and/or figures which are conceptually (by way of reasoning, logic, ideas, or any other mental "mode of operation") interrelated (connected)".* Therefore, data, is the smallest measure unit, consisting in those facts, numbers and figures, that when processed or interpreted generate information (Alavi & Leidner, 2001; Stuhlman, 2016).

Knowledge is developed through learning and it can be defined as the personalized information present in the mind of the human being. (Alavi & Leidner, 2001, p. 109; Stuhlman, 2016). Knowledge is also believed to increase the ability to perform effective decisions, therefore, organizations are very interested in identifying and retrieving knowledge from the data available, for bettering their actions (Alavi & Leidner, 2001). So, the real challenge for businesses dealing with big data, is to convert the data, that comes in such a volume, variety and velocity into information, that later can lead to knowledge creation. Fayyad, Piatetsky-Shapiro, & Smyth (1996), propose that the extraction of knowledge can be presented as a process, that was named process knowledge discovery in databases (KDD):



Fig. 5 - KDD process (Source: Fayyad, Piatetsky-Shapiro, & Smyth (1996))

The KDD process, introduced by Fayyad, Piatetsky-Shapiro, & Smyth (1996), starts with an analysis of the application domain, evaluating the existent knowledge, and defining the expectations for the process. The selection phase, consists in choosing a data set, electing a focus about the variables or data samples, upon which the process will unroll. Pre-processing is the stage where the data selected for analysis is cleaned and pre-processed, expectably obtaining consistent data, this stage include actions as data noise reduction and defining strategies for manage missing data fields (Azevedo & Santos, 2008; Fayyad et al., 1996). The transformation stage, uses dimensionality reduction and projection or transformation methods, to adapt the data, resulting on possible reduction of variables under consideration, or identification of invariant representations. On the data mining stage, algorithms are applied on the data for retrieving patterns from it, using classification rules or trees, regression, and clustering for performing this activity (Fayyad et al., 1996). Interpretation and evaluation consist in the assessment of the mined patterns, that may include visualization of the result patterns, or data in the eyes of the outcome models. The knowledge obtained from the process can then be applied by the users.

When leading with the KDD process and big data, considering the noisy, highly interrelated and unreliable features of the data, increases the difficulty on the identified stages, namely the data mining stage, where development in the statistical techniques, might occur, to retrieve a better outcomes from the process (Gandomi & Haider, 2015).

All the process to extract knowledge from data is only fruitful for organizations if it is used for improving decision-making (Gandomi & Haider, 2015; Sivarajah et al., 2017). Managers expect to have better knowledge about their businesses, through automated data processes, and consequently be better prepared for making decisions (McAfee & Brynjolfsson, 2012). Although there are still decisions made based exclusively on intuition, Economist Intelligence Unit (2014) survey with 607 executives, shows that 54% consider that these decisions are suspect, and 65% indicate that there is an increase on the management decisions based on analytic information. This study concludes that there is an increasing interest of the organization about data and data-driven decision-making, even considering the specificities of big data.

This shows that decision makers are interested in the topic and view decision-making based on big data as a possibility, but there is the need to explore the positive and negative aspects of big data, to evaluate on each situation it can be helpful or become a challenge too big to overcome.

3.1.4. Opportunities

Although there is a significant interest around big data, and a great expectation on the value that it might bring to businesses, it is important to understand the main advantages that organizations can expect from investing in big data technologies. This is crucial to provide a better understanding on what are the possible benefits to achieve. Avoiding misinterpretations that can lead to investments on tools that might not deliver the desired results. With the possibility to obtain knowledge not just from structured data, but also from semi-structured and unstructured data (Ghasemaghaei et al., 2018), might give the unrealistic impression about the business advantages of using big data tools.

It is already known that big data technologies can provide information in a way that was not available before, such as real time insight about the behavior of the individuals and other entities, and even in identifying preferences (Michael & Miller, 2013). Nonetheless, it is important to interpret what can business use this sophisticated insight for, and consequently which opportunities outcome from this knowledge.

The goal for organizations when accepting the challenge to use big data on their processes is to create value for the company, by using tools and methods that allow them to add value to the business (Katal et al., 2013). Although there are specific objectives that organizations may want depending on their needs and industry where they are inserted, some benefits from big data can be considered for almost every business. Manyika et al. (2011), identified five different ways to benefit from big data, if companies can correctly apply the tools and are able to adapt their organization, design and management methods:

- Create transparency if data is easily available to relevant stakeholders in a quick and appropriate way, so that the people that can use the insight are able to access it when necessary, and there is no friction on sharing information between different intervenient.
- Enabling experimentation to discover needs, expose variability, and improve performance companies can store and process performance data in almost real time. Then, completely controlled experiments can be conducted or use the data naturally to analyze variability, allowing managers to have a better insight about the performance of the firm, and act according to the data outcomes (Fosso Wamba, Akter, Edwards, Chopin, & Gnanzou, 2015).

- Segmenting populations to customize actions in a different way with the possibility to analyze and process more data, the opportunity to generate more knowledge about consumers and create more specific segments (even microsegments or personalization), and even have a real time reporting of the changes and evolution of the segments. Thus, companies can use this knowledge to develop tailored actions to target the specific groups, and follow the preferences evolution, to adapt the offers that best suit the segments. For example, with big data, an online store, should be able to automatically process what are the preferences of certain customers, by analyzing their "clicks", feedback and previous purchases, to automatically propose to that person a specific set of products. This can be done without the influence of a manager. With previous technologies, the human resources required to get the data, process it, and transform it into an offer to the customer, would be too costly and time consuming.
- Innovating new business models, products, and services following the previous point, with a bigger insight about the markets, organizations are able to develop new products and services, or adapt the existing ones, according to the information obtained through data. The selection of the new products may now, for example, be based on the data retrieved from the previous ones, and even the price can be defined according to the data obtained from the customers and competitors (Fosso Wamba et al., 2015).
- Replacing/supporting human decision-making with automated algorithms The analytic tools can be an extreme aid for the decision makers, minimizing risk, and uncovering insight that would not be obtained with the previously used tools (Osuszek, Stanek, & Twardowski, 2016). Working with big data can mean a drastic change on the decision-making, even though many decisions cannot be totally automated, by analyzing huge datasets, retrieving more and converting it into better insight, may allow the decisions quality to increase.

Although Manyika et al. (2011) presented the five points as undifferentiated ways to leverage big data, when critically analyzing this proposal, one may argue that the last presented opportunity ("supporting human decision-making"), has a stronger influence over the other dimensions. As argued before, many researchers see the knowledge retrieving process from big data as fruitful because of the positive influence it has on the decision-making process, considering it the main opportunity from using big data tools (Ghasemaghaei et al., 2018; Košcielniak & Puto, 2015; Manyika et al., 2011; McAfee & Brynjolfsson, 2012; Osuszek et al., 2016; Provost & Fawcett, 2013; White, 2012). Consequently, and looking at the other opportunities, one can say that they are a result of better decisions.

For example, when choosing to launch a new product in the market, this product can be based on the knowledge generated by big data. Thus, one can consider that it is also a product of a managerial decision, since most likely there is a strategic decision-making process, that takes into account the insight retrieved from the data. Therefore, studying the decision-making process is key, to understand the other potential opportunities provided by big data.

To allow a more comprehensive understanding of what are the main potentialities of big data tools for business, and building upon Manyika et al. (2011) work, the following table was created, using the covered literature:

Main Benefits	Description	Sources
identified in The		
Literature		
Transparency	Data made available to whom and	(Akter & Wamba, 2016; Chen
	when necessary	et al., 2012; Giest, 2016;
		Manyika et al., 2011)
Improve performance	By having more, better and quickly	(Fosso Wamba et al., 2015;
	data about the performance,	Manyika et al., 2011; Mazzei
	allowing a better evaluation	& Noble, 2017)
Improve	Allowing an almost automatic and	(Akter & Wamba, 2016;
Segmentation	more specific segmentation. To	Manyika et al., 2011; Michael
	adapt offers.	& Miller, 2013; Russom,
		2011)
Innovating new	Use big data's insight to create,	(Akter & Wamba, 2016; Fosso
business models,	adapt or recreate, the existing	Wamba et al., 2015; Manyika
products, and services	models, products or services	et al., 2011)
Replacing/supporting	Helping in the decision-making	(Ghasemaghaei et al., 2018;
human decision-	process, by increasing the quantity,	Košcielniak & Puto, 2015;
making	quality and speed in the	Manyika et al., 2011; McAfee
	information available, by using	& Brynjolfsson, 2012;
	automated processes.	Osuszek et al., 2016; Provost
		& Fawcett, 2013; White,
		2012)

Table 1 – Main benefits of using Big Data (Source: own creation, adapted from Akter & Wamba, 2016; Manyika et al., 2011)

Driver of Competitive	Following the improvements in	(Akter & Wamba, 2016;
Advantage	decision-making, managers can use	Ghasemaghaei et al., 2018;
	that information to identify new	Mazzei & Noble, 2017;
	opportunities. Namely regarding	McAfee & Brynjolfsson,
	expansion, diversification or	2012)
	consumer view.	

3.1.5. Challenges

Big data is recognized to have a lot of potential to help improving businesses decision-making performance, and consequently in creating value (Chen et al., 2012; Ghasemaghaei et al., 2018; Manyika et al., 2011). Although the potential to benefit business is there, obtaining the benefits presented in the previous chapter is not exempt from problems. Organizations are growing a significant interest in big data and its tools, considering the expected generated value from this investment, and to reach the such added value, the complex and substantial challenges need to be overcome (Assunção, Calheiros, Bianchi, Netto, & Buyya, 2015; McAfee & Brynjolfsson, 2012).

Numerous business that invested in creating insight through big data, have been facing difficulties in taking full advantages of those tools (Ghasemaghaei et al., 2018). Many firms that fail to benefit from the big data potential, typically are not able to create the necessary conditions to produce knowledge from the big data tools, often focusing only on some of the specific dimensions of big data, instead of having a global approach (Ghasemaghaei et al., 2018; Wu, Buyya, & Ramamohanarao, 2016). This is not the only challenge that companies face, when trying to leverage big data. Therefore, it is important to explore and identify the different challenges that affects organizations and prevent them from retrieving the maximum gain from the investment in big data.

With the growing interest on the field, and the difficulties of implementation on businesses, researchers have also engaged in understanding the challenges and issues from big data. There is the perspective that the characterizing attributes of big data, explicitly the three V's, are per se a source of difficulties for companies that trying to use big data (Gandomi & Haider, 2015; Wu et al., 2016). This interpretation follows the line of thought that the characteristic of big data present companies with new situations, as the immense volume, variety and velocity, that normally organizations are not prepared for, so this creates frictions and obstacles in

successfully integrating big data in the processes. Therefore, it is assumed that all the challenges result from features of big data (Gandomi & Haider, 2015; Wu et al., 2016).

Furthermore, other authors have gone beyond this interpretation, and explored the challenges created on organizations that have to deal with this different kind of data, i.e. the challenges that result from the interaction between the organization and the tools and the data (Assunção et al., 2015; Katal et al., 2013; Sivarajah et al., 2017).

Sivarajah et al. (2017) identified three main groups of challenges, by performing an evaluation on 227 articles between 1996 and 2015: Data challenges, process challenges and management challenges.

Data challenges are the ones resultant from the data characteristics, basically the challenges indicated by Gandomi & Haider (2015) and Wu et al. (2016), but in this case, it was created a category of challenges to agglomerate the difficulties sourced in the characteristics of the data. Regarding volume, the problems result from the enormous scale of the data, and the ambiguity, complexity, heterogeneity and lively aspects of the data, that hamper the "determining, retrieving, processing, integrating, and inferring" (Sivarajah et al., 2017, p. 269) processes, requiring new techniques to obtain insight. The variety dimension, presents challenges on how to handle data from diverse sources and forms, difficult to process by the traditional systems, since unstructured and varied sourced data makes retrieving meaningful insight tougher (Assunção et al., 2015; Katal et al., 2013). Velocity, refers to the speed at which data comes from various sources and in different forms. The challenge with this dimension is on how to handle data that is constantly moving in high velocity, namely on how to process it, and how to respond to it (Katal et al., 2013; Sivarajah et al., 2017). Other challenges can be considered in this group, according to the considered characteristics of big data, as in this paper, since the three V's are being here considered, making sense to connect the challenges to this interpretation.

The second group of challenges is named "process challenges", this category aggregates all the challenges faced through when analyzing and processing the data, going from the collection to the interpretation of the outcome insight. In this stage 5 five different challenges were identified (Sivarajah et al., 2017):

 Data Acquisition and Warehousing – challenges resulting from this stage are connected to the difficulty to store and upload such a vast amount of data, that at the same time is constantly changing and needing to be moved. Traditional data storage options are not able to cope with the size and complex characteristics of big data, so new tools have to be used to store, organize, and make migrating data a reality (Katal et al., 2013; Russom, 2011).

- Data Mining and Cleansing these challenges are related to the new need to extract and clean the stored unstructured data, transforming it into a structured and perceptive form (Sivarajah et al., 2017). New tools have to be inserted into the organization's configuration that allow the mining and cleansing process to occur, leading often to structural adaptation in the organization.
- Data Aggregation and Integration following the sequence of the previous challenges, after cleaned and mined, the data may be transformed into structured information, but the fact that it was gathered in different forms and by different sources, means that there is the need to combine the information, so that it can be comprehensible and applicable (Sivarajah et al., 2017). Therefore, new interfaces and arrangements need to be made to unsure the integration of the complex data (Assunção et al., 2015).
- Data Analysis and Modelling these challenges are linked to the next step in processing data. After storing, cleansing, mining and integrating the data, there is the need for analyzing and modeling the information, and not just knowing what the data tells about the present situation, but instead to, create conditions to predict future happening through modelling and analysis (Katal et al., 2013; Sivarajah et al., 2017).
- Data Interpretation the last dimension in the process challenges, refers to establishing
 a relationship between the outcome of the data processed, and the decision-making
 that is going to interpret the information, and turn it into knowledge. On this challenge,
 one can consider that there are two aspects to be considered, one is the way the
 information is presented, and the other is the decision maker analytical skill to interpret
 data (De Mauro et al., 2015; McAfee & Brynjolfsson, 2012; Sivarajah et al., 2017)

The third group of challenges is identified as "management challenges", this group aggregates the challenges that individuals face when accessing, operating and administrating the data (Sivarajah et al., 2017). Therefore, there are diverse challenges that outburst from the management activity while dealing with big data:

 Privacy - Katal et al. (2013, p.406), considers this challenge as the most important since it has "conceptual, technical and legal significance". The Facebook recent scandal regarding the unappropriated use of members information, shows how relevant and current this challenge is. When collecting data through such different sources, and in different forms, may arise question regarding its legitimacy. Where often individuals might not be aware that data is being collected. Here, the challenge is to obtain the data necessary, but without interfering with the privacy of the entities involved (Katal et al., 2013; Sivarajah et al., 2017).

- Security this challenge is connected to the need to maintain secure the data that should not be accessed by others. It is the responsibility of the organization to ensure that no private data is not retrieved by other users/entities, that should not have access to it. This problematic of maintaining the data secure, from unwante people is getting more expression within businesses, with a growing number of hack attacks and malware. The task to maintain data safe is a constant struggle, that has to be addressed constantly (Katal et al., 2013; Manyika et al., 2011).
- Data Governance the concept refers to the ability to guarantee the quality throughout the process of data usage, and maintaining its value. The most relevant challenges for organizations consist in "categorizing, modelling and mapping" the data. These three aspects should be the focus when aiming to ensure the quality of the data within the hole process (Michael & Miller, 2013; Sivarajah et al., 2017, p.274).
- Data and Information Sharing Data should be provided in a timely manner, comprehensive and precise, in order to be of use to the entities or individuals that have the need to use it (Katal et al., 2013). The challenge is to keep a controlled system over the permissions to whom the data is available, and at the same time guarantee that the people that have the need for the information can have access to it efficiently (Sivarajah et al., 2017).
- Cost/Operational Expenditures this challenge refers to the need to keep a tight control over the expenses made throughout the process of obtaining knowledge through big data (Sivarajah et al., 2017). The key is to reach an equilibrium between a cost attractive strategy, while guaranteeing the quality in the outcome.
- Data Ownership this is a challenge that is connected to the "rights" to own data, many data is generated through individuals or entities outside the firm, such as customers. Therefore, the challenge lies on assuring that the data collected is in fact property of the organization wanting to use it, to allow editing, modifying and creating without restrictions or concerns (Sivarajah et al., 2017)

Katal et al., (2013) and McAfee & Brynjolfsson (2012), for example, include the challenge related to the lack of skills and skilled people in the organizations, able to deal with big data problems, which can create a gap between the technology available and the competences in the organization to operate, creating a difficulty for leveraging big data. Other challenges could also be included, such as industry specific challenges.

These groups of challenges are a way to categorize the main challenges firms face when using big data on their businesses, and cannot be considered as the only configuration and theoretical construction, since there are other possible interpretations. Even the identified challenges can be interconnected. For example, a volume challenge, can also be a storage challenge.

The presented challenges should not be viewed as an impediment for working with big data, but rather a guide to help organizations understand what the main concerns are and what can be done to minimize the possibilities of an unsuccessful use of big data.

3.2. Strategic Decision-making

3.2.1. Decision-making

Individuals living in the modern world, inserted in a developed society, are presented with a set of challenges and decisions, which are characterized as being more complex than ever before. Those decisions include, individual, collective and corporate ones, that need to be addressed in a daily basis.

These decisions include a broad spectrum of subjects, from financial to everyday life choices. As complexity in decision-making evolves, with impact in ordinary societal life, various disciplines such as psychology and economics have grown a strong interest in studying these processes and the effects that they have on social and economic levels. This can be explained by the constant interest in trying to understand how humans operate and think on different situations (Crozier & Ranyard, 1997).

Decision-making has now been studied for an extended period of time, where there have been numerous studies, aiming to define, explain and help in decision-making. Since the interest in this subject is not exclusively economic, there is a blend of study fields that are trying to analyze and explain this topic, making it a truly multidisciplinary issue (Bell, David E.; Raiffa, Howard; Tversky, 1988). As this paper is developed in consonance with a business related master's program, it is logical to keep the main focus on the economic and business research theories, which were developed to understand decision-making. Nevertheless, other research fields knowledge can be applied when considered relevant.

Although there are many different definitions for decision-making, most of the authors agree that a decision implicates, the presence of certain elements; among those, identification/selection/choice of alternatives, and an action/resolution (Crozier & Ranyard, 1997; Kumar & Sharma, 1998). Alternatives can be characterized as the available action courses to the decision maker at a given time. These alternatives may vary from being very concrete to being rather abstract, as there might be obvious options, or instead others that might take more inventive and creative approach from the decision maker (Hansson, 1994). The decision maker has then the possibility to restrict the available alternatives to arrive to a final choice.

Although decision-making is present in most of the human daily activities, studying this topic has seen a growing interest in the business field. Since the decision makers' choices, in a business context, can have a direct impact on the companies' performance. This makes the study of
decision-making very relevant for businesses that want to avoid poor decisions, that can lead to wastage in resources, consequently affecting the firms' future (Baba & HakemZadeh, 2012).

With Globalization, businesses are often presented with resources that are either similar or comparable with the competition, making it difficult to differentiate and stand out in the market. On that basis, decision-making becomes a crucial element for companies, namely to achieve competitive advantage and generate a superior performance, potentially generating a superior value for the firm (Bylone, 2010).

Decision-making is not always an easy task to perform by human beings, as several constraints have been identified, that affect the outcome of the decision process. Some of the most common variables, found by researchers to affect decisions, are: time, information and cognitive limitations (Saaty, 2008; van Bruggen, 2010). This means that decision makers have limitations in achieving the optimal decision outcome. In the case of business related decisions, the level of complexity is normally higher, as the environment presents specifically unpleasant conditions namely, the timeframe is usually limited, information is often not ideal, and decisions are often difficult or expensive to reverse (Boulding et al., 1994). This means that decisions made inside a corporation are different from other decisions, considering the complexity of the problems and environment presented.

To fully explore the premises on which the research is built up on, it is important to distinguish descriptive, normative and prescriptive of approaches to describe how decisions are processed. As the failure to do so, compromises the creation of knowledge in this field (Vazsonyi, 1990). According to Dillon (1998), this distinction can be used as a base to study how the decision-making are conducted.

The normative models, in decision-making theory, generally aim to explain how decisions should be done, and how the decision maker should behave. In these models, the intention is to optimize the decision-making, to a degree where the decision maker is always able to make the best decision (van Bruggen, 2010). This concept is often connected to a more theoretical approach of the field, where the individuals are seen as fully rational, without emotions, and with all the information available, making the connection with real-life situations harder to accomplish. Often this approach is represented in the form of mathematical or economic models that define standards for evaluating alternatives, and to choose the best decision to make (Baron, 2008; Vazsonyi, 1990). The purpose in normative decision models is to present the decision maker with a solution/behavior, that is reached by identifying compelling properties in the decision alternative (Keller, 1989).

31

On the other hand, descriptive models are used to understand and explain how the decision makers conduct their judgements and decisions (Baron, 2008). In contrast with the normative concept, the descriptive one does not aim at reaching the better/optimal decision. Instead, the focus is on understanding how past and present decision-making is being made, in order to improve future decisions. Therefore, historical data is used to recognize patterns, by studying past behavior (Assunção et al., 2015). These models usually present a better connection with real-life decision-making problems, since the decision makers are viewed as rational beings, that also have emotions, are biased and have limited access to information (van Bruggen, 2010).

The prescriptive models, combine both concepts, as they aggregate a strong theoretical substance present in normative models, which is typically used as base to prescriptive models, directly or indirectly. At the same time, these models include the observation aspect of the descriptive concept, making this perspective more suitable to study real-life situation, since they can be adapted both to the situation and the decision makers' needs (Dillon, 1998; Weber & Coskunoglu, 1990). According to Baron (2008), in order to create a prescriptive model, one can use a normative base for identifying biases, but these biases have to be seen through a descriptive way, to provide a knowledge about the nature of the problem.

A simple way to distinguish between these three approaches look at decision-making, is by looking at the aim of each model type. Normative models goal is to explain what people should in theory do. Descriptive models, intention is to answer the question: What people do and did?. Prescriptive models' purpose, is to analyze what people should and can do (Dillon, 1998; Hansson, 1994).

In this paper decision makers will be seen as unperfect individuals, with faults, remorse and limited cognitive capabilities, in order to have be closer to the real decision maker. Although no inferences will be made on his/her personality or specific traits. The descriptive approach is useful since it is crucial to understand how are decision makers actually operating, in order to evaluate if and how additional tools may be used as an aid for this process. The prescriptive approach could also be analyzed, since the purpose of this paper is also to reach some conclusions on what to do or not to do in the decision-making process, regarding the new tools available. These two concepts are intrinsically related, since the good descriptive models can be used to help creating prescriptive models, since there is the need to understand the problem situation in order to try to purpose a solution (Baron, 2008).

3.2.2. Strategic Decision-making

Not all decisions have the same degree of importance, and not all decisions are treated in the same way by organizations, depending on the level of complexity. There are certain decisions that can be particularly interesting to study, considering the degree of importance they have in the organizations' lives.

Therefore, this project will focus on the decisions necessary to achieve the main goals of the organizations, i.e. the choices that organizations have to make to follow the defined strategy (Ahmed, Bwisa, Otieno, & Karanja, 2014). Considering the significant influence that strategy has on business and performance (Janczak & Thompson, 2005), it makes sense to concentrate on the decisions that lead to the materialization of this strategy. Usually these actions are identified as strategic decisions.

Strategic decision-making is usually connected with highly important choices that can reflect the course of the businesses (Eisenhardt & Zbaracki, 1992), as decision-making is considered the essence of strategy (Molloy & Schwenk, 1995). It includes the plan and design of strategies, and is typically connected to decisions that present a higher levels of risk, present long term effects and are particularly difficult to reverse (Papadakis & Barwise, 1997).

In these specific decisions, the fear to make a bad choice or the regret to not even make one, is particularly present. Making the management of these actions different from other types of decisions (Ahmed et al., 2014). Mainly, strategic decisions are associated with a high complexity level, due to the lack antecedent experience, or an absence of predetermined solutions for the problem resolution (Molloy & Schwenk, 1995). These types of decisions are also seen as being interrelated with the environmental factors where the companies are inserted, a special type of decision under uncertainty (Charles R. Schwenk, 1995; Negulescu, 2014). For a better understanding of choices that illustrate strategic decisions, one can exemplify operations such as, mergers and acquisitions, new markets investments or product selection (Ahmed et al., 2014).

A distinction can be made between process and the content of the strategic decision-making (Janczak & Thompson, 2005). Where the content refers to the type of decision that will be used to follow the strategy, i.e. the specific characteristics of the strategic decisions. As to the process, it refers to the formulation and implementation, focusing on the procedures needed to conduct the decisions. The strategic decision-making process is seen, as an continuing activity for managers, considering the time consumption and complexity of these actions, that require a bigger detail when managing this type of decisions (Negulescu, 2014).

3.2.3. Strategic Decision-making Process

A study conducted by Harvard Business Review Analytic Services (2016), indicates that only 27% of the managers have implemented in their organizations a formal process for decision-making, corporate-wide. The way the decisions are conducted, in the decision making process, are often perceived as lacking structure (McAfee & Brynjolfsson, 2012). This means that although there is an interest in improving the decision-making processes inside the corporation, there is no true investment in studying and implementing strategic decision processes, by most businesses (Harvard Business Review Analytic Services, 2016). Therefore, understanding the strategic decision-making process, can be a step into getting more insight on how these decisions are made.

Decision-making process, in the business context, has been described as the logical steps, phases or routines taken by decision makers to reach a final outcome action (Ahmed et al., 2014). There have been many researches aiming to study and describe the strategic decision-making process. The unstructured and complex characteristics of this phenomenon (Charles R. Schwenk, 1995) lead to an absence of an universally accepted theory(ies) that explain how strategic decisions process are conducted. Thus, one has to choose a model that suits the project's purpose and viewpoint. In this case, the ability to evaluate big data's capabilities to improve the strategic decision making.

There are diverse lines of thought when interpreting the strategic decision-making, authors have chosen different models to illustrate the their theories on how decision-making is performed, namely in the form of simple step by step models, complex course models, models that are interpreted the steps of the process as a continuous cycle, tree models or even matrices (Ahmed et al., 2014). So, even the form on which the processes are presented is not consensual among the literature. Although, many models trying to describe this field, are largely influenced by the rational choice theory, that has served as basis to develop frameworks in different fields, from political science to marketing (Mellers, Schwartz, & Cooke, 1998).

Mintzberg, Raisinghani, & Théorêt (1976) participated in an early attempt to develop a model aiming to explain and identify the phases and sub-phases of the strategic decision-making process. In this theory, it is possible to identify the basis for the strategic decision-making process, and can be illustrated as follows:



Fig. 6 - Strategic Decision-making Phases (Source: Charles R. Schwenk, (1995); Mintzberg et al., (1976))

The identification phase was interpreted as the stage where the opportunities, problems and crises are accessed, on a first sub-phase. On the second sub-phase, the problems are identified in a more clear manner with the information about cause-effect relationships for the decision situations.

The second stage, named development stage is considered as the key for the success of the process (Mintzberg et al., 1976). includes in a first sub-phase the activities developed by organizations that allow the creation of alternative solutions for the problems. On a second stage the ready-made solutions that have been identified need are adapted to the specificities of the problem, or new solutions have to be designed.

The selection stage on the Mintzberg et al. (1976) process, consists in three sub-phases. The screen routine, consists in an evaluation of the identified alternatives, where the most unusable are discarded. The second sub-phase consists in selecting an alternative through analysis, judgement or bargaining. The third sub stage may occur when the decision maker does not have the full capabilities to commit the organizations to the chosen alternative, so the decision needs to go through the necessary approval of a higher hierarchy to be implemented.

The step by step models used to illustrate the decision-making process often portrait similar or comparable stages, although their interpretations might differ. One example was proposed by (Shrivastava & Grant, 1985), where some of the phases and sub phases can be clearly compared to the previously introduced process:



Fig. 7 - Strategic decision-making process (Source: Shrivastava & Grant, 1985)

The stages were separated into three main type of activities, problem familiarization, solution development and decision outcome. The first type of activity encompasses the separation and identification of problems. Including the view of the problem from the perspective of the person who identified it and a preliminary identification of a possible solution. This stage can be concluded under different circumstances, where the conditions for action are met. Such as, availability of resources, reaching a dominant point of view or time constraints. The solution development stage, consists on the stages where the managers need to evaluate the different alternatives, and consider the necessary resources to make that choices, and make the necessary modifications and adaptations to the existing conditions, in order to take it to superior evaluation before implementing the decision. The last stage consists in taking the necessary actions to materialize the decision, according to the specificities of this decision.

In 1996, Harrison also developed a model aiming to explain the strategic decision-making process, where some of the characteristics of the previous models are reflected. He starts by identifying six stages in the decision-making process, with the difference that it is not just sequential, but also circular, and with interactive stages (see Fig 9):

 Setting objectives stage, in this stage Harrison (1996) defends that the objectives that the organization intends to accomplish are defined, considering that every cycle should focus on attaining these goals.

- Searching for alternatives stage, refers to the pursuit for relevant information inside and outside the organization to reach a set of alternatives that potentially can accomplish the defined objective.
- Comparing and evaluating alternatives stage, in this stage the detected alternatives are compared informally or formally based on the perceived relative uncertainty of the effect that the alternatives will have on the organization and the preferences of the decision maker.
- Making the choice stage, is when the decision maker selects one of the options from the set of alternatives.
- Implementing the decision stage, is the stage where the decision is materialized from something abstract into an operational reality.
- Follow-up and control stage, refers to the cyclical aspect of this model, where the author does not consider the implementation as the end of the process. Instead, the need to evaluate the performance of the chosen decision in meeting the firstly selected objectives, is introduced. If there is a mismatch, corrective actions may be necessary, taking the process back to the implantation stage. Or the objectives need to be revised, taking it forward to a new stage for setting the objectives accordingly.

This structure brings some new features compared to the previously introduced models, considering not only the cyclical aspect mentioned on the last stage of the model, but also the synergy created among the several stages, where it is expected to continually improve the process, since the value of the model, should be greater than the sum of the stages individually (E. F. Harrison, 1996). One of these interactions between the stages can be found when implementing decisions, and there is still the need for further research, making the decision maker go back to the second stage of the process, making this process more dynamic than the previously introduced ones.

Furthermore, for the strategic purposes of this decisions, the author introduces the environment, internal and external, as a source of information that influences the decision model. Helping directly on the first stage to set or reset objectives, by identifying positive gaps as the identification of a failure in the competitors offer, that can be fulfilled by this organization. The negative strategic gapes may occur if the company is at significant disadvantage with external environment, and is not able to exploit the available opportunities (E. F. Harrison, 1996). The environment may also influence the assessment of the chosen decision and the

search for alternatives, by providing more relevant information and feedback to the specific stages.



Fig. 8 - Strategic Decision-making Process and relation to the environment (Source: adapted from Harrison (1996))

Considering the dynamic purpose of the model chosen by Harrison (1996), and mainly the view it has on the influence that the environment may have on the decision-making process. From the studied literature, this is the model that best suits this project for evaluating big data as a tool to aid in the decision-making process. Considering the methodological viewpoint, this model may take a rather objective approach when compared to this project positioning, but the interpretation of the model is not linear. Considering that for this project, the decision maker is still viewed as an unperfect individual with limited cognitive capabilities, that is affected by the environment. Therefore, this process can be viewed as construct trying to explain the individual behavior, but it cannot fully explain the individual or constrain his/her actions. It is used as a tool/framework to allow a better interpretation on how the decision-making is processed, and not as a full reality.

This is a rather descriptive model, aiming to illustrate how the decision maker performs when facing strategic decisions, allowing the interpretation of how they behave on these specific circumstances, that may appear as behavioral constrains. At the same time, such model allows

a further discussion on how can the decision makers behave on the presence of a new tool, like the big data technologies.

3.2.4. Decision-making Under Uncertainty

3.2.4.1. Uncertainty in decision-making

According to Damghani, Taghavifard, & Moghaddam (2009), decision-making in a business environment is permanently done under conditions of uncertainty. Furthermore, understanding uncertainty and the role it has on managers' decision-making is key in international marketing. As it is considered to be one of the main impediments for businesses to integrate international ventures (Cavusgil & Godiwalla, 1982). Moreover, researchers defend that from the variables influencing decisions, uncertainty is the one exerting a higher influence on the managers' choices (Aharoni et al., 2011; Cavusgil & Godiwalla, 1982; Crozier & Ranyard, 1997; F. L. Harrison, 1977). Since uncertainty is a wide concept that englobes other factors, as experience, risk propensity and cognitive constraints.

Uncertainty in decision-making occurs when there is limited information about the potential consequences of a given decision (Huettel, 2005). Uncertainty can be interpreted as a scale, where in one hand, there is the deterministic/certain condition. In this end, information is fully available, and knowledge is complete. Therefore, the decision maker has no doubts about the choice to make and the expected outcome. On the opposite extreme, there is pure uncertainty, where the decision maker has a complete absence of knowledge about the problem, being completely exposed to the unknown. In between these opposites, there are problems under risk, that can be considered as a scale, with several degrees of certainty/uncertainty, that will vary depending on decision maker knowledge about the specific problem (Damghani et al., 2009).

Additionally, Walker et al. (2003) defend that besides from having a scale to evaluate uncertainty levels of a certain problem, that they identified as "level", there are two more dimensions to uncertainty. "Location", as where uncertainty is present through the decision process. The third dimension, "nature", refers to the source of the uncertainty, and can occur due to deficiencies in the model, or to inevitable natural variation.

According to Walker et al. (2003), uncertainty cannot be characterized only by the absence of knowledge, as there are different sources of inadequate information, inexactness, unreliability and ignorance. Furthermore, the addition of information to a specific problem, may have a positive or negative influence on the uncertainty level. As the quality of the information, the 39

processing capabilities of the individual or the organization, will influence the decision environment and consequently the uncertainty perceived.

Managers are constantly making decisions under uncertain conditions (Daft, 2008). The fact that uncertainty can come from diverse sources and can be felt in different phases of the decisionmaking process, makes the decision makers' task highly challenging and stressful. Despite the understandable difficulties managers face in such conditions, those decisions still need to be addressed. Thus, the challenge lies on making choices, balancing what is known and the unknown.

Uncertainty is a variable that decision makers seek to decrease or remove, to facilitates the decision process (Crozier & Ranyard, 1997; O. Huber & Kuhberger, 1996). This means that decision makers prefer to take decisions at a lower level of uncertainty, even if it means to control some of the variables of the problem, create alternative choices, or construct future scenarios (Crozier & Ranyard, 1997).

Therefore, this paper focuses on studying the extent at which big data may or not have the ability to reduce or eliminate the uncertainty in the managers' decision-making processes. Eventually allowing the decision maker to feel more comfortable or confident in making choices, and eventually deciding better. Therefore, understanding this concept and its specificities is crucial to then study the role that big data bight have on helping the decision makers to deal with it.

Uncertainty can be viewed in a deterministic way, as a condition triggered by knowledge absence or deficiency (Volz, Schubotz, & Von Cramon, 2004). Yet, this concept is not viewed in such a simplistic and absolute way by the field researchers. There has been an extensive research about uncertainty present in the business actions. Many of these researches focus on the uncertainty sources, aiming to provide a better understanding of the problem that firms face (Walker et al., 2003). This paper also intends to make an evaluation of the sources of uncertainty, so that it is possible to assess big data as a potential tool to reduce uncertainty in strategic decision-making.

The traditional view to describe uncertainty sources makes the distinction between externally caused uncertainty, and internally caused uncertainty (Howell, 1971; Kahneman & Tversky, 1981). This distinction was made fundamentally due to the need to acknowledge that not all uncertainty is perceived equally and that sources could be identified in order to address this problem more efficiently (Howell, 1971). Although researchers have vastly studied and attempted to define and deconstruct the root causes of uncertainty, it is not a consensual

40

subject, as the results obtained until now have been either hard to interpret or confusing (Milliken, 1987). Which makes a conceptualization of the topic difficult. Nevertheless, understanding and analyzing external and internal sources of uncertainty is still highly relevant, as this concepts is fundamental as it serves as base to other organizational theories (Milliken, 1987).

External uncertainty can be generically described as the unpredictability caused by external factors to the decision maker or the organization. Hence factors that are present in the environment where the organization is inserted, typically connected to unpredictable and/or uncontrollable conditions (Grote, 2009; Kahneman & Tversky, 1981). Uncertainty caused by the external factors, is rather connected to the conditions of the environment under which the decision-making process occurs, and not to the specificities of the decision maker.

On the other hand, the uncertainty caused by internal factors, is rather connected to the individual knowledge or ignorance about a problem. Kahneman & Tversky (1981), indicate that the state of knowledge of the decision maker influences the level of uncertainty about a given problem. This kind of uncertainty is typically easier to control, when to the external sources, since it depends on the decision maker capabilities and not on external factors (Volz et al., 2004).

Another distinction was referred by Dosi & Egidi (1991), that divides uncertainty into substantive and procedural uncertainty. Where substantive uncertainty is linked to the lack of information to make a decision. On the other hand, procedural uncertainty is connected to the limitations in computational and cognitive aptitude to deal with the given information.

Following the context of the previous theories, about internal/external sources and the substantive/procedural distinction, Lipshitz & Strauss (1997) also present their viewpoint on the matter. Three fonts of uncertainty were identified, after extensively analyzing the different and nonconsensual conceptualizations of uncertainty: incomplete information, inadequate understanding, (Lipshitz & Strauss, 1997).

The first dimension used to classify the deficit of knowledge caused by the lack in the information available to the decision maker, is identified as incomplete information. It can occur in many ways, as the absence of information can be caused by partial lack of information, partial lack of information or by using unreliable information (Lipshitz & Strauss, 1997).

The second source was named inadequate understanding of the information, that refers to the uncertainty arising from the inability of the decision maker to understand or process the available information, rather than the absence of information. This source of uncertainty may be also connected to the excess or format of the information, as it can vary according to the individuals' ability to handle complex or unclear information (Grote, 2009; Lipshitz & Strauss, 1997).

The last dimension is identified as undifferentiated alternatives, it may occur even if the decision maker is not facing the previous sources of uncertainty, but is unable to differentiate the choices available. Since none of the options clearly dominates the other alternatives (Grote, 2009; Lipshitz & Strauss, 1997).



Concluding, one may present the previously explored concepts as follows:

Fig. 9 - Nature of Uncertainty (Source: Own creation based on Bell, David E.; Raiffa, Howard; Tversky (1988), Dosi & Egidi (1991), and Lipshitz & Strauss (1997))

3.2.4.2. Sources of Environmental uncertainty

Considering the significant effect that the environment has on decision makers choices, research has also focused in exploring the uncertainty related to this factor. Environmental uncertainty or perceived environmental uncertainty can generically be described as the unpredictability caused by external factors to the decision maker or the organization. Hence factors that are present in the environment where the organization is inserted, but are typically connected to unpredictable and/or uncontrollable conditions (Grote, 2009; Kahneman & Tversky, 1981; Volz et al., 2004). Furthermore, this source of uncertainty can arise due to the overall unpredictability of the context surrounding the decision maker, or can originate from a particular element of that environment (Milliken, 1987). Researchers view the environment where the decision-making process occurs, as a crucial determinant for the uncertainty perceived by the decision makers. Lysonski, Levas, & Lavenka (1995), defend that when decision makers are affected by an environment of uncertainty, they may need to adapt their decision-making process to the specificities of the environment. The business environment is viewed as being fundamentally instable, creating uncertainty for managers in their decision-making process (Samsami, Khodadad Hosseini, Kordnaeij, & Azar, 2015).

Duncan (1972) defines environment in decision-making as *"the totality of physical and social factors that are taken directly into consideration in the decision-making behavior of individuals in the organization"*. In his vision, the environment is in fact everything that can potentially affect the decision makers' choices, including factors internal to the organizations and external. The lack of information or the perception to have inadequate information, is viewed as the cause for environmental uncertainty. That can also be associated with the ignorance about the possible outcome of the decisions, and the inability to make predictions about the effect of the environmental changes (Ashill & Jobber, 2010; Duncan, 1972).

This source of uncertainty may arise due to the overall unpredictability of the context surrounding the decision maker or organization, or can originate from a particular element of that environment (Milliken, 1987). Moreover, Milliken (1987) deconstructs environmental uncertainty into three types: state uncertainty, effect uncertainty and response uncertainty. As the failure to understand uncertainty sources and the respective characteristics may lead to inconsistent research findings.

The first type of environmental uncertainty identified in his research, was state uncertainty. Which is described to occur when the decision makers are not confident about their understanding about the alterations of the environment elements, or are unable to make accurate predictions about future changes of those elements. This type of environmental uncertainty can have origin in other relevant agents' actions, that may interfere in the decision outcome, as suppliers, governments or consumers. Alternatively, it might originate from general changes in the specific environment, as technological developments, or demographic changes.

Effect uncertainty is the second type of environmental uncertainty introduced by Milliken (1987), this concept is related to the ability of the decision makers to predict what would be the impact of the environmental changes on the their organization. Meaning that this type of uncertainty is focused on the cause-effect relationship between the environmental changes and the organization (Ashill & Jobber, 2010). This kind of environmental uncertainty may be present,

when a decision maker is aware of a change on the environment – so there is no direct state uncertainty – but he/she is unsure about what effects this change can have on the organization.

The third type of uncertainty is identified as response uncertainty, which is defined as the uncertainty that occurs when decision makers are not able to identify, understand or evaluate all the alternatives available to solve a problem. This kind of uncertainty may arise when the decision maker is choosing, evaluating, or implementing the alternative actions to a problem (Milliken, 1987).

The main factor that distinguishes the three types of uncertainty is the kind of information that the decision maker perceives to be lacking. On state uncertainty, the information lacking is connected to the environment conditions and possible changes. On effect uncertainty, the information missing refers to the effect of changes in the environment, rather than the environment conditions. The response uncertainty, is caused by a lack of information on the possible options to resolve a problem (Milliken, 1987).

Although the distinction between these three types of uncertainty is relevant and useful to understand this source of uncertainty, it does not mean that these types of uncertainty must manifest themselves separately. As decision makers may feel the three types of uncertainty simultaneously. An example is given by Ashill & Jobber (2010), indicating that state uncertainty may come from an introduction of a new product from a competitor; effect uncertainty may arise because the decision maker does not know what is the effect of this new product on organizations' sales; and response uncertainty may be present if the decision maker is unsure about the actions to make in response to this environment change. Summarizing, the picture bellow describes environmental uncertainty and the questions behind each type of uncertainty:



Fig. 10 - Environmental Uncertainty (Source: Own creation based on Milliken (1987) theory)

Furthermore, Sinding, Anex, & Sharfman (1998), use Milliken's study as a basis to make the distinction between internal and external sources of environmental uncertainty. Recognizing that the previous introduced dichotomy, in also applicable in the uncertainty raised by the environment.

There is still a significance lack in consensual concepts in the uncertainty topic, considering the amount of researches developed, and theories created on several fields studying the phenomenon (Duncan, 1972). To facilitate the understanding and to agglomerate all the notions introduced until now regarding uncertainty in decision-making, it is useful to use an illustration that combines all the concepts into a logical framework:



Fig. 11 - Nature of Uncertainty and Uncertainty Sources (Source: Own Creation)

3.2.5. Uncertainty in International Marketing Strategic Decision-making

When the firms are inserted in an international context, the level of complexity is significantly higher, considering the differences in the international environments, that obviously influence the strategies of firms. Therefore, decision makers have to deal with particularly elaborate and multifaceted decisions, eventually even adapt the decision-making process to the specific situations (Chung, 2007). According to Aharoni, Tihanyi, & Connelly (2011), international business decisions are influenced by several variables that have a direct impact on the outcome. The five variables identified as having a greater influence on the decision-making process were:

• The social system where the business and decision maker are inserted;

- Time spam of the decision process;
- Uncertainty perception of the decision, and the risk propensity of the decision makers;
- The interactions of the managers' goals, business units, and the organization as a whole;
- Restrictions faced by decision makers.

Furthermore, Aharoni et al. (2011) defend that the companies' decision-making, when operating in international markets, are characteristically influenced by uncertainty, risk and lack of information. Nevertheless, many businesses and researches in this field fail to recognize the crucial role of the decision maker and how he/she is influenced by the environment. Furthermore, ignoring the cultural, institutional, organizational and market specific variations, present in the international markets, that are sources of uncertainty for the decision maker (Aharoni et al., 2011). As the studies begins to focus more in the decision maker behavior and on the variables influencing his/her decision, researches show that risk, emotions and uncertainty, are not just small parts of the equation, as they exert a profound influence on the person making the decisions (Crozier & Ranyard, 1997).

According to Cavusgil & Godiwalla (1982), the lack of knowledge and consequently uncertainty, is the main impediment for businesses to enroll in international ventures. Considering that uncertainty is connected to the unpredictability of the environmental variables, when conducting businesses in international markets, this volatility is considered to be even more present, or at least perceived in that way (Miller, 1992). Therefore, entering in foreign markets involves a greater risk of uncertainty, namely due to the deficiency of information about the markets and its context (Aharoni et al., 2011). Typically, the international strategic decision-making process in not performed under the presence of all the relevant information. The quality and quantity of the available information is normally very limited, increasing the presence of uncertainty in those decisions (Cavusgil & Godiwalla, 1982).

Therefore, this section is design to explain how the uncertainty felt by decision makers is different when dealing with international marketing decision, when compared to decisions related to their original market. Miller (1992), developed an organizing framework that intends to categorize the interconnected uncertainties that are relevant for managerial decision-making when operating in international markets:

General Environmental Uncertainty	Political	War, revolution, government changes and other political changes.
	Government policy	Trade restrictions, price controls, fiscal and monetary policies, tax policies, earnings repatriation polices, and other policies affecting businesses
	Macroeconomics	Inflation, foreign exchange rates, interest rates, terms of trade
	Social	Terrorist movements, riots, social unrest, changes in social concerns
	Natural	Climate changes, and other natural disasters, such as hurricanes and earthquakes
Industry Specific Uncertainties	Input Market	Changes in the supply, quality of inputs
	Product Market	Changes in consumer taste, availability of substitute and complementary products
	Competition	New entrants, product and process innovation, rivalry among existing competitors
Firm Specific Uncertainties	Operations	Labor relations, availability of resources, production complications
	Liability	Production liability, emission of pollutants
	R&D	R&D activities, and the regulations on product development
	Credit	Problems with collectibles
	Behaviors	Individuals behavior that can include fraudulent behaviors, or conflicting behaviors sourced in

Table 2 - Uncertainty in International Markets (Source: adaptation of Miller (1992))

	certain characteristics of the individuals, as
	culture

General environmental uncertainties refers to the factors that affect the business decisions independent of the industry (Miller, 1992). These uncertainties, such as political or governmental can have a significant influence on the way decision makers behave (Mascarenhas, 1982). For example, if the decision maker perceives that it is not possible to predict the likelihood of a dramatic political change, or changes in the tax system. This creates uncertainty towards the new market, that will affect the decisions. These uncertainties may also be present on the country of origin, but the lack or absence of information and experience that one normally has about their home country, makes the uncertainty level to escalate. Some of the uncertainty, such as the uncertainty about natural disasters, might even be absent regarding the original market, but present in the international market due to lack of knowledge, and not necessarily due to eminent risk (Miller, 1992).

Industry specific uncertainty, concerns the uncertainty that is sourced in the input market, product market and competitive uncertainties (Miller, 1992). Suppliers may have to decide to shift the prices or quantities, which can then affect the company's performance, making the uncertainty to be perceived as higher. This type of uncertainty is not completely independent from the environmental uncertainty. For example, if a company that is operating abroad has a supplier operating in a foreign country, and the government does not allow the supplier in the country, this is a source of both environmental uncertainty and industry specific (Miller, 1992).

The third type of uncertainty identified by Miller (1992) is the firm specific uncertainty, which refers to the internal activities of the firms when operating in international markets. This source of uncertainty includes the relation with the employees operating in the new market, namely the cultural differences and regulations, that the organizations have to consider when making decisions (Lysonski et al., 1995; Miller, 1992). The absence of knowledge about the operations in a foreign country can than create a higher level of uncertainty.

From analyzing the previous table, it is possible to conclude that the uncertainties identified are not exclusive to the international decision, as for example, governmental changes, changes in supply or behavior changes occur in any market. Nevertheless, the big difference is that when operating in a foreign market, the decision maker faces at least the double of the uncertainty, considering the additional sources of uncertainty that outcome from dealing with another government, different culture, new competitors, variable exchange rates and dissimilar regulations (Mascarenhas, 1982). This lack of knowledge generate more uncertainty that was not there when operating in the national market, creating the perception in the decision maker that it is not possible to make estimations about the present and future of the market (Johanson & Vahlne, 1977).

The degree of comfort that the decision maker has with the uncertainty level will then rely much on the experience of the individual abroad, the knowledge base, and the ability to deal with uncertain environments (Aharoni et al., 2011). Even though studies point to the differentiation on the ability to deal with uncertainty caused by international market decisions, Miller (1993) indicates that on his study, there was an agreement among the managers about the uncertainty perceived, associated with the various environmental components.

Summarizing, the uncertainties identified by (Miller, 1992), are not exclusive decision-making regarding international activities, but are the aspects that are considered to affect the most the decision maker, when facing decisions that involve a different market.

3.2.6. Information Technology in Strategic Decision-making

After analyzing how the decisions are processed and how uncertainty is perceived by the decision makers, it is now important to proceed to an evaluation of the potential role of technology in strategic decision-making. This is considered indispensable, considering that big data can be explored through a combination of information technology and human reasoning to contribute to the strategic decision-making process (Intezari & Gressel, 2017; Poleto, Carvalho, & Costa, 2015).

Even though the big data is a relatively new topic, that recently has dawned an immense interest from organizations and academia, the studies about informational technology effects on decision-making have started prior to this big data "hype". Information technology has been defined as "computer-based technology for the storage, accessing, processing and communication of information" (Molloy & Schwenk, 1995, p. 283). Therefore, big data tools have to be considered as part of the information technologies.

There is the general assumption that information technology is able to improve the quality of information, and consequently enhance strategic decision-making quality (Raghunathan, 1999). Therefore, several studies have been conducted trying to understand and explain if this assumption is the reality business are facing, and what are the real effects of using this

49

technologies on strategic decision-making (Andersen, 2001; G. P. Huber, 1990; Molloy & Schwenk, 1995).

Due to the limits in the human cognitive ability, individuals are not able to process all the information that they get in contact with. Nevertheless, this does not mean that organizations accept and are satisfied with this human condition. Many companies feel the need to seek solutions that provide a greater rationality on their actions (Molloy & Schwenk, 1995). Therefore, businesses are keen on investing in technological tools, as big data tools, that potentially enhance rationality in the organizational processes, used to reach their goals. In this way, information technology is seen as having the potential to improve the strategic decisions efficiency and effectiveness (Andersen, 2001; Molloy & Schwenk, 1995).

Now it is important to analyze how the literature sees the potential of information technology in improving strategic decision-making. Namely, in which aspects can companies expect information technology to have an impact on.

One of the capabilities recognized in information technology was the ability to identify problems and opportunities in a fast and accurate manner (G. P. Huber, 1990). With the technology to retrieve more information and from different sources at a pace that is not comparable to the human capabilities. Furthermore, it provides the possibility to have the information available to the decisionmaker quickly after the facts occur. This allows the decision maker to have a more comprehensive understanding of the context, which allows a better and faster recognition of the opportunities and problems, since more information is available. Molloy & Schwenk (1995), corroborated this idea on their empirical study, were it was concluded that the new tools permitted an accurate and fast problem identification, and consequently, more efficient decisions. Identification, was even found to be the most impactful capability for using these technologies.

Another identified possibility allowed by the use of information technologies in strategic decision-making, is to facilitate the availability of information (Citroen, 2011; Molloy & Schwenk, 1995). This is possible due to a greater ability to gather and store more data. Consequently, decision makers have more and easier access to the information, making the process potentially faster and smother, considering that the decision maker would not need to spend as much time in the search of the necessary information.

The third opportunity recognized refers to the improved ability to evaluate the different alternatives, when assessing the strategic decision options (Molloy & Schwenk, 1995), that is also a consequence from the previous explained capability. It is considered one of the activities

where decision makers spend more time, is gathering and interpreting information about the possible consequences of the strategic decisions. With the technological tools, allowing the analysis of a greater quantity of information, the evaluation of alternatives can be conducted through a more thorough analysis and more alternatives can be evaluated, since the information is made available by the tools (Molloy & Schwenk, 1995).

Communication is another capability that is viewed as being enhanced by information technology (Andersen, 2001; G. P. Huber, 1990; Molloy & Schwenk, 1995). It is considered that the communication both internally and externally is made easier by the use of these technologies, permitting the reduction of organizational barriers, enhance creativity, and help identify business opportunities (Andersen, 2001). The ease in communication allows then a better flow of information and permits the decision maker to successfully communicate with others, and provides a better platform for understanding the problem (Molloy & Schwenk, 1995).

Technology information also are considered to have impact on the cost reduction of the processes to collect, store, analyze and treat the data, that is potentially allowed by the implementation of information technologies (Andersen, 2001). The computer networks and data interfaces make the process of working with more data less expensive, when compared with dealing with the same amount of data, working without these technologies. For example, it would require a lot more man power to collect, store, analyze and treat the same data, which would be reflected in the costs (Andersen, 2001). Although it can be considered a cost friendly measure, it also includes a significant investment in the information technology system, which can take some time to recover (Molloy & Schwenk, 1995).

Although much potential is recognized in the use of information technologies, Molloy & Schwenk (1995), refer the data integrity as a potential problem. Considering that the strategic decision-making would rely so heavily on the data handled by this technologies, the lack of accuracy and integrity of the data has proven to dramatically affect the outcome of the decision (Molloy & Schwenk, 1995).

Overall the information technology potential, in helping with the strategic decision-making, is recognized in the literature, mainly due to the ability handle data, increasing quantity, quality, speed and efficiency (Andersen, 2001; Molloy & Schwenk, 1995), which then generates several benefits to the strategic decision-making, as the ones explored previously. The efficiency and effectiveness have been recognized to improve, and the companies consider it as a real aid in

51

the strategic decision-making process (Molloy & Schwenk, 1995). Therefore, information technologies are the key to retrieve value and integrate big data in the decision-making process.

To summarize and illustrate the previously analyzed information, these were the identified main benefits of using information technology for strategic decision-making:

Benefits of using information Technology	Author
Overall increase of speed, efficiency and	(Andersen, 2001; Molloy & Schwenk, 1995;
effectiveness	Raghunathan, 1999)
Problem identification	(G. P. Huber, 1990; Molloy & Schwenk, 1995)
Availability of information	(Citroen, 2011; Molloy & Schwenk, 1995)
Evaluation of alternatives	(Molloy & Schwenk, 1995)
Communication	(Andersen, 2001; G. P. Huber, 1990; Molloy
	& Schwenk, 1995)
Cost	(Andersen, 2001)

Table 3 - Benefits of using information technology in strategic decision-making (Source: own creation)

4. Analysis of the Theoretical Findings

This chapter consists of a theoretical and critical analysis of the previously covered topics. With the aim to provide a standpoint on the existing theories, and study how these different subjects can be conjugated from a different perspective. Therefore, no new literature or theory will be added in this part. Yet, an interpretation of the existing theories is provided.

Considering the critical aspect of this analysis, it requires a personal interpretation of the information obtained in the literature review, therefore, the discourse will include parts written on the first person, to emphasize what are my interpretations.

4.1. Strategic Decision-making Process and Uncertainty

The covered literature has referred to the strategic decisions, namely in international marketing, as processes where uncertainty is typically present (Ahmed et al., 2014; Cavusgil & Godiwalla, 1982; Citroen, 2011; Elbana & Child, 2007; Lipshitz & Strauss, 1997; Riabacke, 2006; van Bruggen, 2010). Nevertheless, I consider that within the various studies conducted regarding uncertainty in decision-making and decision-making process, there is a lack of structure and connection between the process stages and the uncertainty perceived. Therefore, I propose an analysis that contemplates the connection between the uncertainty felt by decision makers, in association to the strategic decision-making process phases. Making a critical analysis on how uncertainty is present in the different phases.

Following the theory proposed by Walker et al. (2003), introduced in the section 3.2.4. that uncertainty can be interpreted in terms of "location" within a model. Which refers to "where" throughout the model uncertainty can be perceived. In this case, the analysis focuses on where in the decision process the uncertainty is present. For a better interpretation for the reader, the strategic decision-making process is again provided:



Fig. 12 - Strategic Decision-making Process and relation with the environment (Source: adapted from Harrison (1996))

I intend with this analysis to explore how uncertainty is affecting the process. In order to provide basis for evaluating the big data tools, regarding its inclusion in each phase of the process. To allow an overview on how these tools may help decision makers in reducing uncertainty. The following table represents my interpretation of the uncertainty felt in the different strategic decision-making process stages. By using the "location" within the process to analize the "nature" of uncertainty present in each specific stage:

Location of	Uncertainty Nature	How?
uncertainty		
Set Objectives	Inadequate Understanding	The uncertainty in this stage results from
Stage	and Incomplete Information	the lack of information and objective data
		(Cavusgil & Godiwalla, 1982; Citroen,
		2011; Riabacke, 2006) that may limit the
		decision maker in setting objectives,
		namely due to the lack of knowledge
		about the environment. Also the cognitive
		limitation to process and understand the
		data received (Schwenk, 1984; van
		Bruggen, 2010), may interfere in the way
		the decision is interpreted.

Table 4 . Strategic Decision Process Uncertainty (Source: Own Creation)

Search for	Inadequate Understanding	In this stage, the main uncertainty is also
Alternatives	and Incomplete Information	connected to the absence of information
Stage		(Cavusgil & Godiwalla, 1982; Citroen, 2011; Riabacke, 2006) or the miss
		interpretation of the available data. Which
		can lead to ambiguity or doubt from the
		decision maker, on whether he/she has
		considered all the available alternatives.
		This can be caused by lack of quantity or
		quality in the information, as well as lack
		of cognitive capabilities to process it
		(Cavusgil & Godiwalla, 1982).
Evaluate	Inadequate Understanding,	On this stage, the uncertainty arises from
Alternatives	Undifferentiated Alternatives	the inability of managers to make
Stage	Incomplete Information	predictions and foresee future scenarios
		of the possible consequences of choosing
		one of the alternatives (Mascarenhas,
		1982; Volz et al., 2004). At the same time,
		there is the uncertainty that outcomes
		from not being able to differentiate the
		alternatives (Elbanna, 2006). This inability
		is connected to the, lack of knowledge,
		incapacity to understand the data or the
		absence of relevant information.
Make Choice	Inadequate Understanding,	This stage presents uncertainty related to
Stage	Undifferentiated Alternatives	the difficulty in selecting one of the
		alternatives, again due to the lack of
		information that allows a better
		distinction between the identified choices
		(Cavusgil & Godiwalla, 1982; Elbanna,
		2006). Furthermore, the decision maker
		might not have the cognitive ability to
		process the information of the evaluating
		stage, concerning each alternative,
		making the selection severe.

Implement	Inadequate Understanding	In this stage the uncertainty is rather
Choice Stage	and Incomplete Information	connected to the previous stages of the problem, and how the manger feels about their quality, efficiency and effectiveness. Therefore, if the manager does not understand or trust the process until this stage, it might influence the implementation stage uncertainty level.
Asses Choice	Inadequate Understanding and Incomplete Information	After the decision is implemented, the decision maker might feel uncertain about the real effects of the decision implemented, due to lack of quantity and/or quality in the information available (Cavusgil & Godiwalla, 1982). Therefore, if there is deficient information, he/she may feel unable to perform a comprehensive evaluation of the outcome. Consequently, the manager might have the perception to be incapable to properly access the choices made areating uncertainty.

Summarizing, this is the configuration that I found more suitable, to present my understanding of the uncertainty existent in the strategic decision-making process. This was conducted, considering the characteristics of each phase of the process, and the nature of uncertainty that I interpret to be present. The relationship between the process and the environment is also affected by uncertainty, namely due to the lack of information about the internal and external environment. This makes it difficult to perform a proper assessment of the environment affecting the overall process. Namely, the definition of objectives, the feedback on the implemented decisions and propositions of alternative solutions based on the environment information.

4.2. Reducing Uncertainty in Strategic Decision-making Process Through Big Data

Decision marker's first steps into reducing uncertainty is often to increase the amount of information available, which is part of big data's characteristics. Therefore, the question resides on if and how can big data tools reduce uncertainty that does not origin from absence of information, in quantity (Lipshitz & Strauss, 1997).

From the analyzed literature, I consider that there is a gap in explaining structurally how big data tools can be applied in the strategic decision-making process. Although the literature refers to the benefits of big data tools in decision-making in general, I notice that most of those studies (Fosso Wamba et al., 2015; Ghasemaghaei et al., 2018; Katal et al., 2013; Manyika et al., 2011; Michael & Miller, 2013), overlook its role in the specific steps of the strategic decision-making process. Which I consider relevant to provide a better understanding of the potential impact that big data can have.

Following the analysis conducted in the previous section, I consider that it is important to make a structured interpretation of the role big data tools can have. Namely, in reducing, or helping managers deal with the uncertainty present in the stages of the chosen strategic decisionmaking process. This will be done by analyzing the benefits covered in the literature review and allocating them to the several stages of the strategic decision-making process. This will allow a better comprehension on how companies can expect big data tools to influence the processes. Potentially avoid misconception on the way big data tools can aid the decision-making.

Before starting this analysis, it is important to note that although big data tools and information technologies were presented in the literature review in separate ways, they cannot be seen separately. Big data tools are part of the information technologies, as explained before. Therefore the benefits should be seen as integrated. (Ghasemaghaei et al., 2018).

I perform a critical interpretation of the reviewed literature, to provide a structured analysis. As explained before, using the potential benefits of big data technologies, to study how it can help decision makers to manage the uncertainty perceived in the stages identified in the chosen strategic decision-making process:

Set objectives – In this stage, as previously covered, the decision maker defines the
objectives of the decision, and as illustrated in the chosen models, the environment can
provide information regarding the strategic gap, that than can be used to set the
objectives. The use of big data tools have here the potential to assist the decision maker

in a different way, by storing and processing, and making data available at an almost real-time manner, allowing the decision maker to have a better overview of the context, and make the choices based on more accurate information (Fosso Wamba et al., 2015; G. P. Huber, 1990; Manyika et al., 2011; Molloy & Schwenk, 1995). Furthermore, the decision maker has an easier access to information and from sources that would not be available without the use of these tools (G. P. Huber, 1990). If this information is trustful, insightful and provided when required, then the decision setting objectives for the strategic decision will be done in a more informed way, when compared to setting objectives, without having any information about the environment. Therefore, using big data through information technologies can help in reducing the uncertainty sourced in the inadequate understand and lack of information that characterizes this stage.

- Search for Alternatives After defining the objectives for the specific strategy decision, the decision maker starts the process to gather information about the alternatives for attaining that goal (E. F. Harrison, 1996). In this stage, big data tools can potentially make a difference by providing more information and identifying more alternatives than with previously used techniques. Given the defined objectives, big data tools should than be able to identify a bigger set of alternatives, considering the ability to make a more complete analysis of the possible courses of action to achieve the objectives (Katal et al., 2013; Molloy & Schwenk, 1995). For example, without big data, the decision maker can identify the alternatives through the interpretation of data, that he/she can have access to (from the reachable sources) and is able to cognitively process, creating a restricted number of alternative courses, that might be incomplete. With big data tools, the options can be analyzed automatically without the cognitive restriction of the human being, from automatically selected sources (that might have not be accessible to the manager before) and the decision maker would be presented with a set of the possible alternatives (Assunção et al., 2015). If conducted properly, should allow a better management of the uncertainty present in this stage of the strategic decisionmaking process.
- Evaluate Alternatives After identifying the possible alternatives for the strategic decision, the decision maker has to perform an evaluation between those options, namely by analyzing the consequences that the different alternatives will have if chosen (E. F. Harrison, 1996; Molloy & Schwenk, 1995). Therefore, in this stage, the prediction capabilities of big data tools (Assunção et al., 2015; Ghasemaghaei et al., 2018), could be used to evaluate the possible outcomes of each alternatives, and therefore have a

better insight into what can be the consequences of implementing a certain decision. This can permit the decision maker to have a better view of the impacts of the alternatives, instead of making the choices without proper information about the future effects of a decision. Allowing a better distinction between alternatives and consequently reducing the uncertainty that involves this stage by providing more insight into the future results of the alternatives, and subsequently a better understanding of each option.

- Make Choice and Implement Choice in these two phases, the decision maker chooses the course of action, after evaluating the alternatives, and implements the chosen alternative, materializing the option (E. F. Harrison, 1993). In the literature, there are references to the bigger automation processes to allow a more efficient decision-making (Andersen, 2001; Ghasemaghaei et al., 2018; Osuszek et al., 2016), but there is no reference to the choice and implementation of strategic decision. Although there are references to automated decisions (Economist Intelligence Unit, 2014; Intezari & Gressel, 2017), such as social media posts, due to the previously explained intrinsic characteristics of the strategic decisions, the role of the decision maker is not yet replaced by the big data tools. The role of these tools at this point in time, is connected mainly to assist in decision-making (Economist Intelligence Unit, 2014; Manyika et al., 2011), and not to substitute the decision maker. From my interpretation of the covered literature, there is little or no role of the big data tools in these two stages, besides the possibility to generate more information if necessary, for making a choice or implementing it, which would in fact mean to move back to the previous stages of the strategic decision process. Although, if the decision maker has confidence in the previous phases of processes until this point, the choice and implementation phases will likely be perceived as comprising less uncertain.
- Assess Choices In this stage, the decision maker evaluates the results of the implemented decision and makes adjustments to the implementation or the objectives, if necessary (E. F. Harrison, 1996). Considering the analytical abilities of big data tools, the decision maker could expect to have a more comprehensive understanding of the effects of the decision, for evaluating further measures. These tools could be used to analyze both the external and internal impact of the decision in a more automated way instead of the traditional data collection strategies used to evaluate the performance of a decision (Fosso Wamba et al., 2015). The analysis performed by these technologies, can potentially propose new alternatives, considering the identified impacts, and

therefore recommence the decision process. If managers have the perception that they can have a more complete insight of the impacts of their decisions, it will help in managing the uncertainty that characterizes this stage. (For example, instead of conducting the traditional surveys to analyze the receptivity of a new product, big data tools give the opportunity to potentially retrieve data and process it, into insightful information about the social media comments about that product. Giving additional information to the decision maker about the decision to implement that new product. Facilitating the assessment of the decision).

This was the my chosen way to provide an explanation on how can potentially big data assist in the strategic decision-making by reducing the existing uncertainty. This was done, interpreting the covered literature and structuring the insight into the stages of the decision-making process. This does not mean that big data potential is restricted to this interpretation. Considering for example the improvements in communication (Andersen, 2001; Manyika et al., 2011; Molloy & Schwenk, 1995) that are associated with these tools, can potentially improve the overall process.

Thus, I consider this study as relevant to provide a better insight between the relationship of the covered topics. Allowing a better comprehension of the potential big data has in this context, by providing a different perspective.

4.3. Uncertainty Intrinsic to the Use of Big Data Tools

Big data tools can, in fact, make available to firms more information than ever before, but it does not guarantee quality data. Which can be vague, imprecise, and a source of uncertainty (Gandomi & Haider, 2015). On the other hand, companies have also faced troubles to treat and transform the data into insightful knowledge. Many companies fail to overcome the challenges presented by big data. Reportedly, less than 27% of firms consider their investment in big data analytics as successful in improving the outcomes of the organizations (Ghasemaghaei et al., 2018; Košcielniak & Puto, 2015).

Big data analytics' goal is to help firms to make decisions faster, reduce the uncertainty level, and base their decisions on evidence, through automated techniques (Giest, 2016; Košcielniak & Puto, 2015). As analyzed in the previous section, there is the potential to improve the decisionmaking process. Therefore, the interest of businesses in data analytic competences, has been increasingly growing. Particularly the ones operating in a complex and tempestuous environments (Košcielniak & Puto, 2015), making big data analytics products highly appealing to any organization concerned with improving the decision-making processes. My analysis conducted so far, has explored the great possibilities of big data, and what can it offer to companies, namely in reducing or helping the decision makers to cope with uncertainty.

Nevertheless, one of the aspects that I consider to be often overlooked in the revised literature is the identification of the uncertainty intrinsic to the usage of big data technologies. I consider that it would allow the decision makers to be better prepared to deal with the perceived uncertainty, if they are able to understand the uncertainty that comes with the decision process and the uncertainty that is inherent to the use of the big data technologies. Furthermore, the managers may be able to rationalize better their decisions by identifying which kind of uncertainty is present when working with big data. That way, they can be in a better position to evaluate the big data tools. For a specific situation use, or to implement in the organization processes, making the necessary adjustments if needed.

Although the literature often refers to the existence of uncertainty when working with big data, and the problems that can outcome from the inability to deal with this uncertainty, I consider it to be beneficial to identify the specific source from where the uncertainty is created. Since the inability to do so, potentially makes it more difficult for the individuals to manage the perceived uncertainty.

This way, firms and decision makers may have a better chance at identifying the problems faced when using these tools. Allowing a better evaluation on how the tools can or not be considered an advantage for the business.

Following the analysis conducted in the previous sections, the next table connects the main types of challenges identified in companies (see section 3.1.5), when using big data technologies, and assigns the present uncertainty nature. The table number four, aims at explaining my understanding on how the usage of big data is also a source of uncertainty per se, considering the revised literature (please see the following page).

Challenges	Uncertainty Nature	How?
Data	Inadequate Understanding	When dealing with the higher volume, velocity
Challenges		and variety challenges, the main uncertainty
		comes from an lack of certainty on how to deal
		with the new characteristics of data and if the
		organization is prepared to integrate and act
		on the generated insight (De Mauro et al.,
		2015; Economist Intelligence Unit, 2014;
		Russom, 2011). For example, companies may
		be able to retrieve information from social
		media posts but be unsure on what to do with
		that insight. Furthermore, there is the
		uncertainty about the quality and the sources
		of the data, identified as veracity by
		(Ghasemaghaei et al., 2018; Oracle, 2012),
		which can influence the outcome of a decision
		(Akter & Wamba, 2016; Karami, 2015; McAfee
		& Brynjolfsson, 2012).
Process	Inadequate Understanding	When processing the data, there is the
Challenges	and Incomplete Information	uncertainty that bursts from not being able to
		interpret the results that outcome from the
		knowledge creation process using a big data
		tool (De Mauro et al., 2015; Russom, 2011;
		Sivarajah et al., 2017). Additionally, there is the
		uncertainty that the data process is faulted or
		not adequate for the organization or decision.
		Generating a feeling of doubt about the
		outcome (Katal et al., 2013). For example, if a
		manager is not confident about the process to
		retrieve knowledge from data, it might create
		an ever bigger doubt about the decision to
		make.

Table 5 – Uncertainty from using Big Data Tools (Source: Own Creation)

Management	Inadequate Understanding	This type of challenges clearly present
Challenges	and Incomplete Information	uncertainty in terms of absence or
		incompleteness of the information available.
		The lack of information may even lead to
		misconducts or law-breaking behaviors that
		can cause more uncertainty (Sivarajah et al.,
		2017). For example, the misinformation or
		inadequate interpretation of the privacy laws
		of the customers may lead to severe
		consequences for the companies (Economist
		Intelligence Unit, 2014). Therefore, the
		decision maker might be affected, and have
		the perception that he/she is not fully capable
		to act according to the regulations.

This is the way I chose to demonstrate how uncertainty is present when using big data tools, although it cannot be understood as the only perspective. Even though I consider that the previous table, is able to provide an overview of the connections between the main challenges and uncertainty, using he revised literature. Other challenges can be identified, and additional ways can be used to study uncertainty in this situation. Nevertheless, by conducting this analysis it can be concluded, that big data tools not only help decision makers to deal with some of the uncertainty but are also fonts of uncertainty.

4.4. Theoretical Framework

From the previous sections, one can conclude that companies wanting to take advantage of the big data potential can, in fact, have the possibility to improve the strategic decision-making process. Explicitly, by helping managers to cope with the uncertainty associated with these actions. Yet, the procedure to integrate the big data tools into the organization operations is not exempt from difficulties. Integrating these technologies requires a constant effort from the organization, to reach the desired improvement in the strategic decision-making.

To illustrate the constant challenge that companies face when applying big data technologies in their strategic decision-making process, the following framework was developed.



Fig. 13 - Big Data Tool in Strategic Decision-making Framework (Source: Own Creation)

The purpose of the framework is to present an illustration of what can be expected from applying big data tools in the strategic decision-making process. As presented in the previous sections, big data technologies have the potential to aid decision makers when facing strategic decisions. By helping to manage and reduce the uncertainty present in the different stages of the process. Nevertheless, the usage of this new technologies in the organization, as indicated on section 4.3, also are sources of uncertainty, originated from the intrinsic challenges of big data.

Both, the reduction of uncertainty and the inherent of big data tool uncertainty will affect the process, and therefor, the outcome decision. Consequently, it is necessary that the decision maker performs a regular evaluation on how big data is helping in the uncertainty reduction in each phase. Furthermore, also making an assessment on how is the uncertainty outcoming from

the challenges of big data affecting the final outcome of the process. When performing this evaluation, managers can consult the analysis conduct in the sections 4.1 and 4.3 to understand what the main factors of uncertainty are, and how they can be affecting the decision process.

After evaluating the outcome decision and eventual problems with the inclusion of big data tools, into the organization, the company or the manager, can implement measures to enhance the big data capabilities and reduce the uncertainty associated with using the new tools. This process should be done after every strategic decision, to constantly assess how the organization is adapting to big data technologies and how to work with different strategic decisions.

On the idealistic, almost unattainable scenario, the company has fully integrated these tools in the strategic decision-making process, where there is no uncertainty about the data, processes or management. Making the organization fully adaptable to the big data tools, taking full advantage from its potential. On the opposite scenario, companies may feel, after evaluating the uncertainties perceived in the decision-making process, that the tradeoff between reducing uncertainty through big data tools and creating uncertainty by using them, is not worth it. In this situation, either the organization is willing to adapt and work on improving the way the tools are integrated in the organization, or it might become ineffective and costly to continue using these technologies.

Companies should face big data as an instrument to be integrated in the organization, and not as a final solution, since it requires constant work from the adopting businesses, to achieve the explained strategic decision-making benefits.

5. Discussion

In this section, provides insight on how this project research can be applied, and explores the limitations felt when developing this thesis. Furthermore, indications on possible future steps for studying this topic are described.

5.1. Practical implications and recommendations

This study is particularly relevant to international marketing, considering the particularly high level of uncertainty faced by decision makers when dealing with strategic decisions involving transnational environments (see section 2.2.5). Even though this problematic is not specific to the international marketing field, it can provide more insight on how to perform strategic decisions in an international setting, under severe uncertainty.

This project provides relevant information for managers dealing with international strategic decision-making, namely by providing a relevant review of the literature about big data, decision-making and uncertainty in decision-making. Which can allow a comprehensive understanding about the topic and give an overview of the main benefits and challenges of big data in strategic decision-making, and how uncertainty is present in those decisions.

Furthermore, this paper provides an analysis, that can be used directly by the decision maker, permitting an identification of the uncertainties perceived by the decision maker in those situations. Additional, the individuals already dealing with big data on their strategic decisions can have a better understanding on the possibilities that big data has in aiding the strategic decision-making. Also, potentially removing unrealistic expectations about the role of the big data tools.

This project may assist managers when facing marketing strategic decision-making, in an international uncertain environment. An example can be described to illustrate this situation. As such, the situation of a marketing manager, having to face the decision to select a new product to be introduce in a foreign market. Facing challenges, this individual if considering resorting to big data tools, may use this research in the following ways:

- Help to evaluate the benefits and challenges of big data;
- Assist in the identification of the uncertainties present in the decision process phases;
- Clarify how can big data assist in this process.
Therefore, the decision maker may be better informed if wanting to integrate big data on the decision process.

5.2. Limitations

One of the limitations present in the development of this project was the lack of studies about this specific topic. Although there is an extensive literature about decision-making, uncertainty and a growing number of researches about big data, there is a lack of studies that cover the combination of three themes. This was considered a limitation, since the amount of literature that had to be covered to analyze the three topics, into useful insight, was rather extensive. Despite being considered a limitation for this research, it was also faced as an opportunity, since it was considered a chance to develop a topic that is not extensively covered in the literature.

Another constraint that affected the progress of this project was time. Although there is a considerable amount of time to prepare and write this type of projects, time has to be considered as a limitation. Considering that the restriction in time is always a factor that affects the project development. If more time was available, potentially more literature could have been analyzed, alternative paths could have been explored, and different methods could have been used. Still, time is a constraint in most activities, therefore, one attempts to provide the best output in the available period.

The last constraint is also connected with the previous limitation. The incapacity to contact managers using big data on their strategic decisions in international environments, was a limitation, considering that the option was not available in the project time period. Due to the reduced number of managers in that situation and lack of response, primary data collection was not a possibility. Nevertheless, the chosen course of action, was to include a theoretical analysis, to contribute for the knowledge creation.

5.3. Further Research

This project allows several perspectives for conducting further research, considering the broader scope of the theme. One example of a possible future study, would be to focus on one type of strategic decisions. For example, by gaining more insight on how the specificities of a particular decision are, and how could big data be used to aid the decision maker in that scenario. This could provide more knowledge into the chosen decision, and a comparison could be made with the results obtained in this project.

Another alternative for a future investigation, could be to focus in the characteristics of the decision maker to see how the different type of decision makers deal with the uncertainty present in strategic decisions. Furthermore, an analysis could be conducted on how the attitudes from decision makers towards uncertainty, affect their relationship with big data tools.

Within this topic's research, primary data could be collected, to generate more insight on how the theories and proposals could be applicable in real life decision. On the next section, a suggestion is presented on how primary data collection could be used for further research.

5.3.1. Primary Data Collection – Interview Methods and Design

When choosing to conduct primary data collection, there are several techniques from which the researchers can choose from, according to the scope of the study. Among the alternatives, interviews is often chosen as a method to collect data in business and management research (Rowley, 2012). It is possible to note, as described by Kuada (2012), that interviews allow the researcher not only to access qualitative data, as well as quantitative data. Furthermore, using qualitative interviewing potentially allows the researcher to achieve *"an insight into the lived experiences of the person."* (Kuada, 2012, p.98).

If choosing to conduct further research in this project by collecting primary data, interviews would be the chosen method for getting additional insight on the topic. Considering that it viewed as a valuable technique for researchers *"interested in collecting facts, or gaining insights into or understanding of opinions, attitudes, experiences, processes, behaviors, or predictions"* (Rowley, 2012, p. 261). Therefore, bearing in mind the scope of the present research and the potential insight interviews can give, this method is particularly interesting. If further research would be conducted on how the researched topic can be transported to real-life situation, interviews have the possibility to get direct insight from decision makers dealing with the studied situations. Allowing the researcher to access further information on the experiences, behaviors and processes of the individual dealing with international strategic decision-making using big data.

Aligned with this view, on how interviews can contribute to the researchers' quest for a better insight on someone else's mind, Saunders et al. (2008, p. 318) defends that using this type of data can also contribute to gather *"valid and reliable data that are relevant to your research question(s) and objectives"*. Regarding the type of interview, it is possible to see across the literature authors that divide it according to the level of structure, that an interview can have

(Rowley, 2012; Saunders et al., 2008). In that sense, the interviews were divided in three types as follow: structured interviews, semi-structured interviews and unstructured/in-depth interviews.

Unstructured interviews are viewed as rather informal, where a general area is covered in depth, according to the researcher interests, without following a predetermined list of questions. The interviewee is invited to talk freely, and is the researchers' job to maintain the focus on the relevant aspects (Bryman & Bell, 2011; Kuada, 2012; Saunders et al., 2008). This requires significant interviewing skills, to avoid dispersion from the central topic of study (Kuada, 2012).

Structured interviews typically consist in predetermined number of questions, that normally is higher when comparing to the unstructured approach (Rowley, 2012). In these type of interviews, the questions are standardized, and the answers are expected to be shorter and more precise. Also, the questions are asked in the same order to every interviewee (Rowley, 2012; Saunders et al., 2008). The purpose of this interviews is often *"to collect quantifiable data they are also referred to as 'quantitative research interviews"* (Saunders et al., 2008).

In semi-structured interviews, the researcher has themes and questions that will potentially integrate the interview, although it is not fixed or standardized, as it may be changed on different interviews (Saunders et al., 2008). The questions order can also be adapted according to the development of the interview. Rowley (2012, p. 262) suggests as a starting point, to set an *"interview schedule that centers on around six to 12 well chosen and well-phrased questions to be delivered mostly in a set order, but with some flexibility in the questions asked, the extent of probing, and question order"*.

Semi-structured and unstructured interviews are viewed as suited for exploratory studies, giving the researcher the chance to identify issues that may not be covered in the theoretical insight (Kuada, 2012). Unstructured interviews require stronger interviewing skills to maintain the focus of the research, which might present significant challenges to unexperienced researchers (Rowley, 2012).

Therefore, and according to the present research aim, semi-structured is viewed as the best fit for a possible further research. According to this level of structure, it provides the researcher the possibility to experience some freedom, while interviewing, despite having a clear idea of the *"themes and questions to be covered"* (Saunders et al., 2008, p. 320). Allowing the interview to be conducted in a more adaptive manner, following a more concrete approach to obtain

69

specific answers when desired, but having the possibility to be more flexible about the questions and topic covered when considered valuable.

The interviews should be conducted by collecting data directly with managers dealing with international marketing strategic decision-making on companies using big data tools. Furthermore guidelines could be created with the intended topics to cover, or even auxiliary questions. To provide a better illustration on how semi-structured interviews could be included in a further research about this topic, an example of a questionnaires is provided:

Focus	Question	Purpose	Source		
Strategic Decision- making	How would you describe the process for making strategic decision in international marketing? (How is the process? Which are the decisions)	Evaluate if the chosen strategic decision-making process is adequate to illustrate these type of decisions.	(E. F. Harrison, 1996)		
Big Data	What is the role of big data in each of the process stages?	Examine the role of big data in a rea-life decision.	(Fosso Wamba et al., 2015; Katal et al., 2013; Manyika et al., 2011)		
	Are you satisfied with the integration of big data tools in the organization?	ata addressed the expectations.	(Ghasemaghaei et al., 2018)		
	What can it be done to retrieve more value from Big Data?	Retrieve information on how can the process to integrate the tools improve.	(Manyika et al., 2011 and see section 3.4)		
Uncertainty	Do you consider that you face greater uncertainty in international decisions? (Why?)	Assessment of the uncertainty perceived in international decisions.	(Miller, 1992)		

Table 6 – Semi-structured interview example questions (Source: Own Creation)

	What are the main sources	Assess the main sources	(Lipshitz &
	of uncertainty in these	of uncertainty.	Strauss, 1997;
	decisions?		Miller, 1992;
			Milliken, 1987)
Big Data and	How would you describe	Insight on how the	(see section 3.1)
Uncertainty	the uncertainty felt in each	decision maker perceives	
	phase?	uncertainty on the	
		different stages, to	
		compare with the	
		theoretical results.	
	Does big data help in	Examine the role of big	(Fosso Wamba
	reducing that uncertainty?	data in a rea-life decision.	et al., 2015;
	(How? In every step of the		Katal et al.,
	decision process?)		2013; Manyika
			et al., 2011)
Big data and	How do you manage the	Understand how decision	(see section 3.3
Strategic	uncertainty created by	makers manage the	and 3.4)
Decision-	using big data	uncertainty from using big	
making	technologies?	data.	

To retrieve the valuable insight from the obtained data, one should use a coding sheet to identify the common themes within the obtained responses and generate answers to the proposed questions. The questions here displayed, are aimed at getting more practical knowledge on the topics covered in this paper, by obtaining practical information to assistance. Possibly aiding in the answer of the problem and in understanding how these problematics affect and are dealt with by real decision makers.

This is only an example on how an interview could generate insight for a further research in this topic. Although it seems to be a structured questionnaire, the order could be flexible, according to the interviewee answers and the course of the interview. This would potentially allow a better insight on how the studied theories and the analyses are transportable to the real life decisions. Potentially could be used to make adjustments on the project outcome, considering the new data.

6. Conclusion

This section completes the thesis, by presenting the main conclusions that result from the research outcome. This will be done by providing a clarification on how the research questions were covered in the different section of the project, contributing to the answer of the proposed problem. Furthermore, a reflection on the contribution of this thesis to the field research is conducted, serving as an evaluation of the relevance of the paper.

6.1. Conclusion

Considering the growing interest around big data, both from academia and businesses, this project proposed to further study the implications of this issue in strategic decision-making. Therefore, a problem was formulated as basis for this research: "How can big data affect uncertainty in strategic decision-making?". The goal was to acquire insight through the study of the relevant literature, before entering the discussion on the theme. Therefore, four research question were defined and answered in this paper, helping to shape the research to address the main set problem.

"What is the potential of big data?"

The first research question was selected to direct the literature review to an evaluation of the possibilities that big data can provide to businesses. This was achieved by disclosing the characteristics associated with this phenomenon, and by presenting the benefits and challenges covered in the literature. This section of the literature review allows a better comprehension of the possible positive and negative consequences of integrating such technologies in a business.

"How decision makers conduct their strategic decisions?"

The second research question is also addressed in the literature review section. In this case, the concept of strategic decision was defined, and presented in the form of process, to help understanding the different stages that compose these decisions. Furthermore, the main obstacles faced by decision makers in these situations were explored, where uncertainty was identified as a substantial issue.

"How does uncertainty affect strategic decision-making in international marketing?"

The third research question was answered both in the literature review and on the analysis. On the literature review, the study of uncertainty included the identification of sources, and the exploration of how the environment is connected to the increase of uncertainty. Additionally, the main aspects augmenting uncertainty in international marketing were provided, considering the identified gap in the literature review. Uncertainty related to the different steps of strategic decision-making, was also object of analysis in section 4.1. Providing a structure to understand the way uncertainty is present in the different phases of the decision process.

"What can be the role of big data in reducing uncertainty in strategic decision-making?"

The last research question is covered in the analysis of the theoretical findings, where an assessment of the potential of big data tools to reduce uncertainty in the strategic decision process, is conducted. In this analysis, the uncertainty emerging from the usage of big data technologies is also addressed, to provide a comprehensive study on how can big data be useful for strategic decisions.

By answering the four explained questions, it was possible to construct a theoretical foundation to understand how big data can influence the strategic decision-making uncertainty. Therefore, providing the necessary insight to answer the formulated problem. This was achieved by gaining further knowledge about uncertainty in strategic decision-making process and understanding its different phases. Allowing a better comprehension about the capabilities of big data by analyzing it through the strategic decision-making process view-point.

6.2. Contribution of the Research

This research contributes to the field study, by providing a different perspective on how big data can be used for aiding managers in strategic decisions. Without looking at big data as a perfect solution nor as a frenetic source of problems, this paper is positioned to give a more comprehensive understanding of the theme. Providing a literature review that allows an interpretation separately or conjunctly of the "big data" and "strategic decision-making" topics. Furthermore, the critical analysis conducted, presents an interpretation of the covered literature in a new way, that has not been covered in the literature. By combining the uncertainty with the stages constituting the strategic decision-making process, it allows both decision makers and researchers to reflect on the different difficulties faced in each stage.

This different standpoint might allow managers dealing with specifically uncertain situations, as strategic decision in international marketing, to identify better the sources of uncertainty in each stage and potentially act on it. Additionally, if considering big data as a tool to reduce that uncertainty, this project also presents an overview on how big data can be used on those specific situations.

Other researchers might also view this perspective as insightful and consider it as possible manner to approach this problem, and study further the topic by using this understanding. Which has already been proposed on section 5.3.

7. References

- Aharoni, Y., Tihanyi, L., & Connelly, B. L. (2011). Managerial decision-making in international business: A forty-five-year retrospective. *Journal of World Business*, *46*(2), 135–142.
- Ahmed, A. H., Bwisa, H., Otieno, R., & Karanja, K. (2014). Strategic Decision Making: Process, Models, and Theories. *Business Management and Strategy*, *5*(1), 78–104.
- Akter, S., & Wamba, S. F. (2016). Big data analytics in E-commerce: a systematic review and agenda for future research. *Electronic Markets*, *26*(2), 173–194.
- Alavi, M., & Leidner, D. E. (2001). Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *Management Information Systems Quarterly*, 25(1), 107–136.
- Amado, A., Cortez, P., Rita, P., & Moro, S. (2018). Research trends on Big Data in Marketing: A text mining and topic modeling based literature analysis. *European Research on Management and Business Economics*, 24(1), 1–7. https://doi.org/10.1016/j.iedeen.2017.06.002
- Andersen, T. J. (2001). Information technology, strategic decision making approaches and organizational performance in different industrial settings. *The Journal of Strategic Information Systems*, 10(2), 101–119.
- Ashill, N. J., & Jobber, D. (2010). Measuring state, effect, and response uncertainty: Theoretical construct development and empirical validation. *Journal of Management*, *36*(5), 1278–1308.
- Assunção, M. D., Calheiros, R. N., Bianchi, S., Netto, M. A. S., & Buyya, R. (2015). Big Data computing and clouds: Trends and future directions. *Journal of Parallel and Distributed Computing*, 79–80, 3–15.
- Azevedo, A., & Santos, M. F. (2008). KDD, SEMMA and CRISP-DM: a parallel overview. *IADIS European Conference Data Mining*, (January), 182–185.
- Baba, V. V., & HakemZadeh, F. (2012). Toward a theory of evidence based decision making. Management Decision (Vol. 50).
- Baron, J. (2008). Normative Models of Judgment and Decision Making. *Blackwell Handbook of Judgment and Decision Making*, 19–36.

- Bell, David E.; Raiffa, Howard; Tversky, A. (1988). *Decision making: descriptive, normative and prescriptive interactions*. Cambridge University Press.
- Boulding, W., Moore, M. C., Staelin, R., Corfman, K. P., Dickson, P. R., Fitzsimons, G., ... Weitz, B.A. (1994). Understanding managers' strategic decision-making process. *Marketing Letters*,
- Bryman, A., & Bell, E. (2011). *Business Research Methods* (3rd ed.). New York: Oxford University Press.
- Bryman, A., & Bell, E. (2015). Business Research Methods. Social Research.
- Burrell, G., & Morgan, G. (1979). Sociological Paradigms and Organisational Analysis Elements of the Sociology of Corporate Life. London: Heinemann.
- Bylone, M. (2010). Effective Decision Making. AACN Advanced Critical Care, 21(2), 130–132.
- Cavusgil, S. T., & Godiwalla, Y. M. (1982). Decision-Making for International Marketing: A Comparative Review. *Management Decision*, *20*(4), 47–54.
- Charles R. Schwenk. (1995). Strategic Decision Making. Journal of Management, 21(3), 11–21.
- Chen, H., Chiang, R. H. L., & Storey, V. C. (2012). Business Intelligence and Analytics: From Big Data to Big Impact. *Management Information Systems Quarterly*, *36*(4), 1165–1188. 2
- Chung, H. F. L. (2007). Structure of marketing decision making and international marketing standardisation strategies. Journal of Management Development (Vol. 23).
- Cibangu, S. K. (2010). Paradigms, Methodologies, and Methods. *Library and Information Science Research*, *32*(3), 177–178.
- Citroen, C. L. (2011). The role of information in strategic decision-making. *International Journal of Information Management*, *31*(6), 493–501.
- Cronin, P., Ryan, F., & Coughlan, M. (2008). Undertaking a literature review: a step-by-step approach. *British Journal of Nursing*, *17*(1), 38–43. 9
- Crozier, R., & Ranyard, R. (1997). Cognitive process models and explanations of decision making. Routledge Taylor & francis Group, New york. London.
- Cuterela, S. (2012). Globalization: Definition, Processes and Concepts, (July 2010), 365–370.

Daft, R. L. (2008). Management. South-Western Cengage Learning.

Damghani, K. K., Taghavifard, M. T., & Moghaddam, R. T. (2009). Decision Making Under Uncertain and Risky Situations. *Enterprise Risk Management Symposium Monograph* Society of Actuaries, 1–21.

- Danson, M., & Arshad, N. (2014). The Literature Review. In K. O'Gorman & R. MacIntosh (Eds.), Research Methods for Business & Management: A Guide to Writing Your Dissertation (pp. 37–57). Oxford: Goodfellow Publishers Ltd.
- De Mauro, A., Greco, M., & Grimaldi, M. (2015). What is big data? A consensual definition and a review of key research topics. *AIP Conference Proceedings*, *10*, 97–104.
- Diebold, F. X. (2012). On the Origin(s) and Development of the Term "Big Data". SSRN Electronic Journal, 1–6.
- Dillon, S. M. (1998). Descriptive Decision Making: Comparing Theory with Practice. 33 Rd Conference of the Operational Research Society of New Zealand, (June), 10.
- Doole, I., & Lowe, R. (2008). International Marketing Strategy: Analysis, Development and Implementation (5th ed.). London: South-Western Cengage Learning.
- Dosi, G., & Egidi, M. (1991). Substantive and procedural uncertainty. *Journal of Evolutionary Economics*, 293–305.
- Duncan, R. B. (1972). Characteristics of Organizational Environments and Perceived Environmental Uncertainty. *Administrative Science Quarterly*, *17*(3), 313–327.
- Dzaleva, T. (2009). Globalization and International Trade Policies. In *Fourth International Scientific Conference* (pp. 1–13).
- Economist Intelligence Unit. (2014). The Deciding Factor : Big Data & Decision Making, 1–5.
- Eisenhardt, K. M., & Zbaracki, M. J. (1992). Strategic Decision Making. *Strategic Management Journal*, 13, 17–37.
- Elbana, S., & Child, J. (2007). Services, industry evolution, and the copetitive strategies of product firms. *Strategic Management Journal*, *28*(2), 431–453.
- Elbanna, S. (2006). Strategic decision-making: Process perspectives. International Journal of Management Reviews, 8(1), 1–20.
- Erevelles, S., Fukawa, N., & Swayne, L. (2016). Big Data consumer analytics and the transformation of marketing. *Journal of Business Research*, *69*(2), 897–904.
- EYGM, Ke, W., & Peng, T. (2014). Big data Changing the way businesses. *International Journal of Simulation: Systems, Science and Technology*, *16*(April), 28.

- Fayyad, U., Piatetsky-Shapiro, G., & Smyth, P. (1996). From Data Mining to Knowledge Discovery in Databases. *American Association for Artificial Intelligence*, *17*(3), 37–54.
- Fisher, D., DeLine, R., Czerwinski, M., & Drucker, S. (2012). Interactions with big data analytics.
- Fosso Wamba, S., Akter, S., Edwards, A., Chopin, G., & Gnanzou, D. (2015). How "big data" can make big impact: Findings from a systematic review and a longitudinal case study. *International Journal of Production Economics*, 165, 234–246.
- Friel, D. (2017). Understanding institutions: different paradigms, different conclusions. *Revista de Administração*, 52(2), 212–214.
- Gandomi, A., & Haider, M. (2015). Beyond the hype: Big data concepts, methods, and analytics. International Journal of Information Management, 35(2), 137–144.
- Ghasemaghaei, M., Ebrahimi, S., & Hassanein, K. (2018). Data analytics competency for improving firm decision making performance. *Journal of Strategic Information Systems*, *27*(1), 101–113.
- Gibson, A. (2016). Philosophical Questions: Distinguishing Paradigms and the Issue of Subjective-Objective Dimension Nominalism. Retrieved December 27, 2016, from
- Giest, S. (2016). BIG DATA ANALYTICS FOR POLICY DESIGN: ELIMINATING UNCERTAINTY OR PARALYSING DECISION-MAKERS? *World Congress of Political Science*, *36*(4), 1165–1188.
- Goes, P. B. (2007). Big Data and IS Research. MIS Quarterly, 31(4), 3-8.
- Grote, G. (2009). Defining and Identifying Uncertainties in Organizations. In *Management of Uncertainty* (1st ed., pp. 11–27). London: Springer-Verlag London.
- Hansson, S. O. (1994). Decision Theory. KTH, 19(1), 1–94.
- Harrison, E. F. (1993). Inter disciplinary Models of Decision Making. *Management Decision*, 31(8), 27–33.
- Harrison, E. F. (1996). A process perspective on strategic decision making. *Management Decision Iss Journal of Educational Administration*, *34*(3), 46–53.
- Harrison, F. L. (1977). DECISION-MAKING IN CONDITIONS OF EXTREME UNCERTAINTY. Journal of Management Studies, 14(2), 169-178.
- Harvard Business Review Analytic Services. (2016). The Evolution of Decision Making: How Leading Organizations Are Adopting a Data-Driven Culture. *Harvard Business Review*, 1–

- Hoffmann, E. (1980). Defining information: An analysis of the information content of documents. Information Processing and Management, 16(6), 291–304.
- Howell, W. C. (1971). Uncertainty from internal and external sources: A clear case of overconfidence. *Journal of Experimental Psychology*, *89*(2), 240–243.
- Huber, G. P. (1990). A Theory of the Effects of Advanced Information Technologies on Organizational Design, Intelligence, and Decision Making. *Academy of Management*, *15*(1), 47–71.
- Huber, O., & Kuhberger, A. (1996). Decision processes and decision trees in gambles and more natural decision tasks. *The Journal of Psychology*, *130*(3), 329–339.
- Huettel, S. A. (2005). Decisions under Uncertainty: Probabilistic Context Influences Activation of Prefrontal and Parietal Cortices. *Journal of Neuroscience*, *25*(13), 3304–3311.
- Intezari, A., & Gressel, S. (2017). Information and reformation in KM systems: big data and strategic decision-making. *Journal of Knowledge Management*, *21*(1), 71–91.
- Janczak, S., & Thompson, J. (2005). The Strategic Decision-Making Process in Organizations. Problems and Perspectives in Management, 3(3), 58–70.
- Jesson, J., Matheson, L., & Lacey, F. M. (2011). What is a literature review? In *Doing your literature review: Traditional and systematic techniques*.
- Johanson, J., & Vahlne, J.-E. (1977). The internationalization process of the firm A model of knowledge development and increasing foreign market commtments. *Palgrave Macmillan Journals*, *8*(1), 23–32.
- Kahneman, D., & Tversky, A. (1981). Variants of uncertainty. *Cognition*, 11(2), 143–157.
- Karami, A. (2015). A framework for uncertainty-aware visual analytics in big data. *CEUR Workshop Proceedings*, *1510*, 146–155.
- Katal, A., Wazid, M., & Goudar, R. H. (2013). Big data: Issues, challenges, tools and Good practices. 2013 6th International Conference on Contemporary Computing, IC3 2013, 404– 409.
- Keller, L. R. (1989). Decision research with descriptive, normative, and prescriptive purposes. Annals of Operations Research, 19(1), 485–487.

- Košcielniak, H., & Puto, A. (2015). BIG DATA in Decision Making Processes of Enterprises. *Procedia Computer Science*, 65, 1052–1058.
- Kotler, P., & Armstrong, G. (2011). Principles of Marketing, 14th.
- Kuada, J. (2012). Research Methodology A Project Guide for University Students. Samfundslitteratur Press.
- Kumar, A., & Sharma, R. (1998). *Marketing Management*. (Atlantic Publishers & Distributors, Ed.).
- Laney, D. (2001). 3D Data Management. Meta Group, 949(February 2001), 4.
- Larsson, T. (2001). The Race to the Top. Washington.
- Lipshitz, R., & Strauss, O. (1997). Coping with uncertainty: A naturalistic decision-making analysis. *Organizational Behavior and Human Decision Processes*, *69*(2), 149–163.
- Lysonski, S., Levas, M., & Lavenka, N. (1995). Environmental uncertainty and organizational structure: a product management perspective. *Journal of Product & Brand Management*, *4*(3), 7–18.
- Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Byers, A. H. (2011). Big data: The next frontier for innovation, competition, and productivity. *McKinsey Global Institute*, 1(1), 1–13.
- Mascarenhas, B. (1982). Coping with Uncertainty in International Business. *Journal of International Business Studies Fall*, 13(2), 87–98.
- Mayer-Schönberger, V., & Cukier, K. (2013). *Big Data: A Revolution That Will Transform How We Live*. (H. M. Harcourt, Ed.). London: Eamon Dolan/Mariner Books.
- Mazzei, M. J., & Noble, D. (2017). Big data dreams: A framework for corporate strategy. *Business Horizons*, *60*(3), 405–414.
- McAfee, A., & Brynjolfsson, E. (2012). Big data: The Management Revolution. *Harvard Business Review*, (October), 1–9.
- Mellers, B. A., Schwartz, A., & Cooke, A. D. J. (1998). Judgment and decision making. *Annual Review of Psychol.*, 49, 447–477.
- Michael, K., & Miller, K. (2013). Big data: New opportunities and new challenges. SSIT, IEEE Society on Social Implications of Technology, 46(6), 22–24.

- Miller, K. D. (1992). A Framework for Integrated Risk Management in International Business. Journal of International Business Studies, 23(2), 311–331.
- Miller, K. D. (1993). Industry and Country Effects on Managers' Perceptions of Environmental Uncertainties. *Journal of International Business Studies*, *24*(4), 693–714.
- Milliken, F. J. (1987). Three Types of Perceived Uncertainty about the Environment: State, Effect, and Response Uncertainty. *Academy of Management Review*, *12*(1), 133–143. 2
- Mintzberg, H., Raisinghani, D., & Théorêt, A. (1976). The Structure of "Unstructured" Decision Processes. *Administrative Science Quarterly*, *21*, 246–275.
- Mitrović, B., & Stefanović, Z. (2007). GLOBALIZATION AND EVOLUTIONARY PROCESSES IN CONTEMPORARY ECONOMY, 4(149052), 21–27.
- Molloy, S., & Schwenk, C. R. (1995). The effects of information technology on strategic decisionmaking. *Journal of Management Studies*, *32*(3), 283–311.
- Negulescu, O. (2014). Using a Decision-Making Process Model IN STRATEGIC MANAGEMENT. *Review of General Management*, *19*(1), 111–123.
- Oracle. (2012). Oracle: Big data for the enterprise. Oracle White Paper, (June), 16.
- Osuszek, L., Stanek, S., & Twardowski, Z. (2016). Leverage big data analytics for dynamic informed decisions with advanced case management. *Journal of Decision Systems*, *25*, 436–449.
- Papadakis, V., & Barwise, P. (1997). Strategic Decisions: An Introduction. In *Strategic Decisions* (p. 319). Boston: Springer.
- Poleto, T., Carvalho, V. D. H. de, & Costa, A. P. C. S. (2015). The Roles of Big Data in the Decision-Support Process: An Empirical Investigation. *Business Information Processing*, *216*, 10–21.
- Provost, F., & Fawcett, T. (2013). Data Science and its Relationship to Big Data and Data-Driven Decision Making. *Mary Ann Liebert*, 1(1), 51–59.
- Raghunathan, S. (1999). Impact of information quality and decision-maker quality on decision quality: A theoretical model and simulation analysis. *Decision Support Systems*, 26(4), 275– 286.
- Reinsel, D., Gantz, J., & Rydning, J. (2017). Data Age 2025: The Evolution of Data to Life-Critical. IDC White Paper; Sponsored by Seagate, (April), 1–25. Retrieved from

- Riabacke, A. (2006). Managerial Decision Making Under Risk and Uncertainty. *International Journal of Computer Science*, 32(November), 453–459.
- Rowley, J. (2012). Conducting research interviews. *Management Research Review*, 35(3/4), 260–271.
- Russom, P. (2011). Big data analytics. TDWI Best Practices Report, 1–35.
- Saaty, T. L. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences*, 1(1), 83–98.
- Samsami, F., Khodadad Hosseini, S. H., Kordnaeij, A., & Azar, A. (2015). Managing Environmental Uncertainty: From Conceptual Review to Strategic Management Point of View. International Journal of Business and Management,
- Saunders, M., Lewis, P., & Thornhill, A. (2008). *Research Methods for Business Students*. *Research methods for business students*.
- Schutz, T. (2017). The 2017 global data management benchmark report. Experian.
- Schwenk, C. R. (1984). Cognitive simplification process in strategic decision making. *Strategic Management Journal*, 5(December 1982), 111–28.
- Shrivastava, P., & Grant, J. H. (1985). Empirically Derived Models of Strategic Decision-Making Processes. *Strategic Management Journal*, 6(2), 97–113.
- Sigel, K., Klauer, B., & Pahl-Wostl, C. (2009). Conceptualising uncertainty in environmental decision-making: The example of the EU water framework directive. *Ecological Economics*, 69, 502–510. https://doi.org/10.1016/j.ecolecon.2009.11.012
- Sinding, K., Anex, R., & Sharfman, M. (1998). Environmental Uncertainty, Corporate Strategy and Public Policy. *The Graduate Management Review*, 1–18.
- Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical analysis of Big Data challenges and analytical methods. *Journal of Business Research*, *70*, 263–286.
- Stuhlman, D. D. (2016). Knowledge Management Terms. Retreived from http://home.earthlink.net/~ddstuhlman/defin1.htm (accessed on 29/05/2018)
- van Bruggen, G. H. (2010). Marketing Decision Making and Decision Support: Challenges and Perspectives for Successful Marketing Management Support Systems. *Foundations and Trends in Marketing*, 4(4), 209–332.

- Vazsonyi, A. (1990). Decision Making: Normative, Descriptive and Decision Counseling. *Managerial and Decision Economics*, 11(5), 317–325.
- Volz, K. G., Schubotz, R. I., & Von Cramon, D. Y. (2004). Why am I unsure? Internal and external attributions of uncertainty dissociated by fMRI. *NeuroImage*, *21*(3), 848–857.
- Walker, W. E., Harremoës, P., Rotmans, J., van der Sluijs, J. P., van Asselt, M. B. A., Janssen, P., &
 Krayer von Krauss, M. P. (2003). Defining Uncertainty: A Conceptual Basis for Uncertainty
 Management in Model-Based Decision Support. *Integrated Assessment*, 4(1), 5–17.
- Weber, E. U., & Coskunoglu, O. (1990). Descriptive and prescriptive models of decision-making: implications for the development of decision aids. *IEEE Transactions on Systems, Man, and Cybernetics, 20*(2).
- White, M. (2012). Digital workplaces: Vision and reality. *Business Information Review*, 29(4), 205–214.
- Wu, C., Buyya, R., & Ramamohanarao, K. (2016). Big Data Analytics = Machine Learning + Cloud
 Computing. In M. Kaufmann (Ed.), *Big Data: Principles and Paradigms* (pp. 1–27).
 Massachusetts.
- Xu, Z., Frankwick, G. L., & Ramirez, E. (2016). Effects of big data analytics and traditional marketing analytics on new product success: A knowledge fusion perspective. *Journal of Business Research*, 69(5), 1562–1566.

8. Appendix

Appendix A

-	Journal 💌	Туре	٣	Title 💌	Usage	-	Year 💽	Author 🔽	Page Nº 🔻	Volu 🔻	Issue 🔻	Topic Covered 🛛 🗸	î
1	Electronic N	Scientific	: Ar	Big data analytics in E-comn	Literature	Rev	2016	Akter, S., & Wan	r 173-194	26	2	Big Data	
3	Journal of Pa	Scientific	: Ar	Big Data computing and clo	Literature	Rev	2015	Assunção, M. D.	3-15	79	1	Big Data	
5	Managemer	Scientific	: Ar	Business Intelligence and Ar	Literature	Rev	2012	Chen, H., Chiang	1165-1188	36	4	Big Data	
6	Journal of A	Scientific	: Ar	What is big data? A consense	Literature	Rev	2015	De Mauro, A., G	97-104	10		Big Data	
7	SSRN Electro	Scientific	: Ar	On the Origin(s) and Develo	Literature	Rev	2012	Diebold, F. X.	1-6			Big Data	
9	American A	Scientific	: Ar	From Data Mining to Knowl	Literature	Rev	1996	Fayyad, U., Piate	37-54	17	3	Big Data	
10	Interaction	Scientific	: Ai	Interactions with big data a	r Literature	Rev	2012	Fisher, D., DeLin	50-59	19	3	Big Data	
11	Internationa	Scientific	: Ar	How "big data" can make bi	Literature	Rev	2015	Fosso Wamba, S	234-246	165		Big Data	
12	Internationa	Scientific	: Ar	Beyond the hype: Big data c	Literature	Rev	2015	Gandomi, A., &	137-144	34	2	Big Data	
14	MIS Quarter	Scientific	: Ar	Big Data and IS Research	Literature	Rev	2007	Goes, P. B.	3-8	31	4	Big Data	
15	Information	Scientific	: Ar	Defining information: An an	Literature	Rev	1980	Hoffmann, E.	291-304	16	6	Big Data	
16	Contempore	Scientific	: Ar	Big data: Issues, challenges,	Literature	Rev	2013	Katal, A., Wazid,	404-409			Big Data	
19	Global Instit	Sceientif	ic F	Big data: The next frontier f	Literature	Rev	2011	Manyika, J., Chu	1-13	1	1	Big Data	
20	Eamon Dola	Book		Big Data: A Revolution That	Literature	Rev	2013	Mayer-Schönbe	242			Big Data	
21	Harvard Bus	Scientific	c Re	Big data: The Management	Literature	Rev	2012	McAfee, A., & Br	r 1-9			Big Data	Ē.
22	SSIT, IEEE So	Scientific	: Ar	Big data: New opportunities	Literature	Rev	2013	Michael, K., & M	22-24	46	6	Big Data	
23	Oracle Whit	Scientific	c Re	Big data for the enterprise.	Literature	Rev	2012	Oracle	1-16			Big Data	
26	TDWI Best F	Scientific	c Re	Big data analytics	Literature	Rev	2011	Russom, P.	1-35			Big Data	
27	Journal of B	Scientific	: Ar	Critical analysis of Big Data	Literature	Rev	2017	Sivarajah, U., Ka	263-286	70		Big Data	Ē
28	Business Inf	Scientific	: Ar	Digital workplaces: Vision a	Literature	Rev	2012	White, M.	205-214	29	4	Big Data	ī.
29	Morgan Kau	Book Sec	ctio	Big Data Analytics = Machin	Literature	Rev	2016	Wu, C., Buyya, R	1-27			Big Data	ī.
8	Economist I	Scientific	c Re	The Deciding Factor : Big Da	Literature	Rev	2014	Economist Intell	1-5			Big Data + Decision Making	1
13	Journal of St	Scientific	: Ar	Data analytics competency	f Literature	Rev	2018	Ghasemaghaei,	101-113	27	1	Big Data + Decision Making	Ē.
17	Procedia Co	Scientific	: Ar	Big Data in Decision Making	Literature	Rev	2015	Košcielniak, H., 8	1052-1058	65	1	Big Data + Decision Making	ī.
18	Meta Gorup	Report		3D Data Management	Literature	Rev	2001	Laney, D.	1-4			Big Data + Decision Making	Ē.
24	Journal of D	Scientific	: Ar	Leverage big data analytics	f Literature	Rev	2016	Osuszek, L., Star	436-449	25	2	Big Data + Decision Making	1
25	Mary Ann Li	Scientific	: Ar	Data Science and its Relatio	r Literature	Rev	2013	Provost, F., & Fa	51-59	1	1	Big Data + Decision Making	I.
52	Harvard Bus	Scientific	: Re	The Evolution of Decision N	l Literature	Rev	2016	Harvard Busines	1-20			Big Data + Decision Making	1
65	Harvard Bus	Scientific	c Re	Big data: The Management	Literature	Rev	2012	McAfee, A., & Br	1-9	1	1	Big Data + Decision Making	Î.
2	Manaaemer	Scientific	: Ar	Knowledge Management ar	Literature	Rev	2001	Alavi. M., & Leid	107-136	25	1	Big Data + Knowledge	1
4	IADIS Europ	Scientific	: Ar	KDD, SEMMA and CRISP-DM	Literature	Rev	2008	Azevedo, A., & S	3-5	1		Big Data + Knowledge	i.
75	Internationa	Scientific	: Ar	Managing Environmental U	r Literature	Rev	2015	Samsami, F., Kho	215-229	10	7	Decisio Making + Uncertainty +	Е
77	The Gradua	Scientific	: Ai	Environmental Uncertainty,	Literature	Rev	1998	Sinding, K., Anex	(1-18			Decisio Making + Uncertainty +	Е
53	Journal of Ex	Scientific	: Ar	Uncertainty from internal a	r Literature	Rev	1971	Howell, W. C.	240-243	89	2	Decisio Making + Uncertinty	ī.
55	The Journal	Scientific	: Ar	Decision processes and dec	i Literature	Rev	1996	Huber, O., & Kul	329-339	130	3	Decisio Making + Uncertinty	1
56	Journal of N	Scientific	: Ar	Decisions under Uncertainty	Literature	Rev	2005	Huettel, S. A.	3304-3311	25	13	Decisio Making + Uncertinty	1
37	Marketing L	Scientific	: Ar	Understanding managers' s	t Literature	Rev	1994	oulding, W., Mo	413-426	5	4	Decision Makig + Strategic	Ē.
40	Journal of N	Scientific	: Ar	Strategic Decision Making	Literature	Rev	1995	Charles R. Schw	11-21	21	3	Decision Makig + Strategic	1
48	Strategic Mo	Scientific	: Ar	Strategic Decision Making	Literature	Rev	1992	Eisenhardt, K. M	17-37	13		Decision Makig + Strategic	Ē
33	Journal of N	Scientific	: Ar	Theoretical construct develo	Literature	Rev	2010	Ashill, N. J., & Jo	1278-1308	36	5	Decision Makin+ Uncertainty	Ī.
36		Book		Decision making: descriptive	Literature	Rev	1988	Bell, David E.; Ra	aiffa, Howar	d; Tvers	ky, A.	Decision Making	ī.
38	AACN Advar	Scientific	: Ar	Effective Decision Making	Literature	Rev	2010	Bylone, M.	130-132	21	2	Decision Making	Ĩ
43		Book		Cognitive process models an	Literature	Rev	1997	Crozier, R., & Ra	257			Decision Making	
44	Enterprise R	Scientific	: Ar	Decision Making Under Unc	Literature	Rev	2009	Damghani, K. K.,	1-21			Decision Making	
45	Operational	Scientific	: Ai	Descriptive Decision Making	Literature	Rev	1998	Dillon, S. M.	1-10	1		Decision Making	
50	КТН	Scientific	c Re	Decision Theory	Literature	Rev	1994	Hansson, S. O.	1-94	19	1	Decision Making	
66	Annual Revi	Scientific	: Ai	Judgment and decision mak	Literature	Rev	1998	Mellers, B. A., So	447-477	49		Decision Making	
74	Internationa	Scientific	: Ar	Decision making with the ar	Literature	Rev	2008	Saaty, T. L.	83-98	1	1	Decision Making	Ĩ
34	Manageme	Scientific	: Ar	Toward a theory of evidence	Literature	Rev	2012	Baba, V. V., & Ha	832-867	50	5	Decision Making + Information	ſ.
42	Journal of In	Scientific	: Ar	he role of information in str	Literature	Rev	2011	Citroen, C. L.	493-501	31	6	Decision Making + Information	Ĩ
73	Decision Sup	Scientific	: Ar	mpact of information qualit	Literature	Rev	1999	Raghunathan, S.	275-286	26	4	Decision Making + Information	+
58	Palgrave Ma	Scientific	: Ar	The internationalization pro	Literature	Rev	1977	Johanson, J., & V	23-32	8	1	Decision Making + Internationa	Ĩ
39	Managemer	Scientific	: Ar	Decision-Making for Interna	Literature	Rev	1982	Cavusgil, S. T., &	47-54	20	4	Decision Making + Internationa	I
41	Journal of N	Scientific	: Ai	Structure of marketing decis	Literature	Rev	2007	Chung, H. F. L.	635-648	23	7	Decision Making + Internationa	I
54	Academy of	Scientific	: Ai	A Theory of the Effects of A	Literature	Rev	1990	Huber, G. P.	47-71	15	1	Decision Making + IT	Í.
61	Atlantic Pub	Book		Marketing Management	Literature	Rev	1998	Kumar, A., & Sha	543			Decision Making + Marketing	
78	Foundations	Scientific	: Ar	Marketing Decision Making	Literature	Rev	2010	van Bruggen, G.	209-332	4	4	Decision Making + Marketing	

Continues on the next page.

	Jour	nal 🖪	T	Туре	•	Title 🛛	Usage	-	Year	*	Author	Page Nº 🔻	Volu 🔻	Issue 🔻	Topic Covered 🚽 🚽
60) Ann	als of C)¢ S	cientifi	c Ai	Decision research with des	Literature	Rev	İ	1989	Keller, L. R.	485-487	19	1	Decision Making + Models
76	5 Stra	tegic N	1c S	cientifi	c Ai	Empirically Derived Models	Literature	Rev	i	1985	Shrivastava, P.,	897-113	6	2	Decision Making + Models
79	9 Mar	nageria	IS	cientifi	c Ai	Decision Making : Normativ	«Literature	Rev	İ	1990	Vazsonyi, A.	317-325	11	5	Decision Making + Models
82	2 IEEE	Transo	ac S	cientifi	c Ai	Descriptive and prescriptive	e Literature	Rev	ľ	1990	Weber, E. U., 8	(310-317	20	2	Decision Making + Models
69	Ə Adr	ninistra	ti S	cientifi	c Ai	The Structure of "Unstructu	II Literature	e Rev	i	1976	Mintzberg, H.,	Ri 246-275	21		Decision Making + Process
70) Jour	nal of I	ИS	cientifi	c Ai	The effects of information	Literature	e Rev	i	1995	Molloy, S., & So	h 283-311	32	3	Decision Making + Srategic + IT
53	1 Mar	nageme	er S	cientifi	c Ai	A process perspective on st	r Literature	Rev	i	1996	Harrison, E. F.	46-53	34	3	Decision Making + Stategic + Pro
33	1 Busi	ness M	la S	cientifi	c Ai	Strategic Decision Making:	P Literature	e Rev	i	2014	Ahmed, A. H., I	3v78-104	5	1	Decision Making + Strategic
7:	1 Revi	ew of 0	GeS	cientifi	c Ai	Using a Decision-Making Pr	c Literature	Rev	İ	2014	Negulescu, O.	111-123	19	1	Decision Making + Strategic
72	2 Stra	tegic D	eВ	Book Se	ctic	trategic Decisions: An Intro	d Literature	Rev	i	1997	Papadakis, V., a	& 319			Decision Making + Strategic
32	2 The	Journa	۱۱S	cientifi	c Ai	Information technology, st	r Literature	Rev	İ	2001	Andersen, T. J.	101-119	10	2	Decision Making + Strategic + IT
57	7 Prob	olems a	n S	cientifi	c Ai	The Strategic Decision-Mak	i Literature	Rev	i	1992	Janczak, S., & T	h 58-70	3	3	Decision Making + Strategic + Pro
46	5 Jour	nal of E	ĒνS	cientifi	c Ai	Substantive and procedura	l Literature	Rev	İ	1991	Dosi, G., & Egic	li, 293-305	10	7	Decision Making + Uncertainty
47	7 Adr	ninistra	ti S	cientifi	c Ai	Characteristics of Organizat	i Literature	Rev	i	1972	Duncan, R. B.	313-327	17	3	Decision Making + Uncertainty
49	9 Spri	nger-Ve	er B	Book Se	ctic	Defining and Identifying Un	Literature	Rev	i	2009	Grote, G.	11-27			Decision Making + Uncertainty
59	9 Cog	nition	S	cientifi	c Ai	Variants of uncertainty	Literature	e Rev	i	1981	Kahneman, D.,	8143-157	11	2	Decision Making + Uncertainty
62	2 Org	anizatio	or S	cientifi	c Ai	Coping with uncertainty: A	r Literature	Rev	i	1997	Lipshitz, R., & S	tr 149-163	69	2	Decision Making + Uncertainty
63	3 Jour	nal of F	Pr S	cientifi	c Ai	Environmental uncertainty	a Literature	e Rev	i	1995	Lysonski, S., Le	va 7-18	4	3	Decision Making + Uncertainty
68	3 Aca	demy o	f S	cientifi	c Ai	Three Types of Perceived U	r Literature	Rev	i	1987	Milliken, F. J.	133-143	12	1	Decision Making + Uncertainty
80) Neu	rolmag	ie S	cientifi	c Ai	Why am I unsure? Internal	a Literature	e Rev	i	2004	Volz, K. G., Sch	ul 848-857	21	3	Decision Making + Uncertainty
83	1 Inte	grated	AS	cientifi	c Ai	Defining Uncertainty: A Cor	Literature	Rev	i	2003	Walker, W. E.,	H 5-7	4	1	Decision Making + Uncertainty
64	1 Inte	rnatior	na S	cientifi	c Ai	Coping with Uncertainty in	l Literature	e Rev	i	1982	Mascarenhas,	B. 87-98	13	2	Decision Making + Uncertainty +
67	7 Jour	nal of I	n S	cientifi	c Ai	Industry and Country Effect	Literature	Rev	i	1993	Miller, K. D.	311-331	23	2	Decision Making + Uncertainty +
30) Jour	nal of N	<i>N</i> S	cientifi	c Ai	Managerial decision-makir	Literature	Rev	i	2011	Aharoni, Y., Tih	a 135-142	46	2	Decsion Making + International
35	5 Blac	kwell H	łc S	cientifi	c Ai	Normative Models of Judgr	n Literature	Rev	i i	2008	Baron, J.	19-36	4		Decsision Making + Model

1 Electronic Martinte Colorellister and	THE	Usage	rear	Author	r uge n-	v		
1 Electronic Warkets Scientific Article	Big data analytics in E-comm	Literature Revi	2016	Akter, S., & Warr	173-194	26	2	Big Data
2 Management Informatio Scientific Article	Knowledge Management an	Literature Revi	2001	Alavi, M., & Leid	107-136	25	1	Big Data + Knowledge
3 Journal of Parallel and D Scientific Article	Big Data computing and clou	Literature Revi	2015	Assunção, M. D.	3-15	79	1	Big Data
4 IADIS European Scientific Article	KDD_SEMMA and CRISP-DM	Literature Revi	2008	Azevedo A & S	3-5	1		Big Data + Knowledge
E Management Informatic Scientific Article	Rusinoss Intelligence and An	Literature Revi	2000	Chon H Chiang	1165 1100	26	1	Pig Data
5 Wanagement Injormatio Scientific Article	Business intelligence and An	Literature Rev	2012	Chen, H., Chiang	1105-1100	50	4	
6 Journal of AIP Scientific Article	What is big data? A consens	Literature Revi	2015	De Mauro, A., Gi	97-104	10		Big Data
7 SSRN Electronic Journal Scientific Article	On the Origin(s) and Develo	Literature Revi	2012	Diebold, F. X.	1-6			Big Data
8 Economist Intelligence L Scientific Report	The Deciding Factor : Big Dat	Literature Revi	2014	Economist Intelli	1-5			Big Data + Decision Making
9 American Association fo Scientific Article	From Data Mining to Knowle	Literature Revi	1996	Favvad. U., Piate	37-54	17	3	Big Data
10 Interaction Scientific Article	Interactions with hig data ar	Litoraturo Povi	2012	Fisher D. Delin	50 50	10	2	Pig Data
10 Interaction Scientific Article	Here "his data" and make his	Literature Devi	2012	Fasse Marsha C	224.246	10	5	Dig Data
11 International Journal of Escientific Article	How big data can make big	Literature Rev	2015	Fosso wamba, s	234-246	102		Big Data
12 International Journal of I Scientific Article	Beyond the hype: Big data c	Literature Revi	2015	Gandomi, A., & H	137-144	34	2	Big Data
13 Journal of Strategic Infor Scientific Article	Data analytics competency f	Literature Revi	2018	Ghasemaghaei, I	101-113	27	1	Big Data + Decision Making
14 MIS Quarterly Scientific Article	Big Data and IS Research	Literature Revi	2007	Goes, P. B.	3-8	31	4	Big Data
15 Information Processing Scientific Article	Defining information: An an	Literature Revi	1980	Hoffmann F	291-304	16	6	Big Data
16 Contomporary Computin Scientific Article	Big data: Issues, shallonges	Literature Revi	2012	Katal A Wazid	404 400	10	Ŭ	Big Data
16 Contemporary Computin Scientific Article	Big data: issues, challenges,	Literature Rev	2013	Katal, A., Waziu,	404-409			Big Data
17 Procedia Computer Scien Scientific Article	Big Data in Decision Making	Literature Rev	2015	Koscielniak, H., &	1052-1058	65	1	Big Data + Decision Making
18 Meta Gorup Report	3D Data Management	Literature Rev	2001	Laney, D.	1-4			Big Data + Decision Making
19 Global Institute McKinse Sceientific Repor	Big data: The next frontier for	Literature Revi	2011	Manyika, J., Chu	1-13	1	1	Big Data
20 Eamon Dolan/Mariner EBook	Bia Data: A Revolution That \	Literature Revi	2013	Maver-Schönber	242			Big Data
21 Harvard Rusiness Review Scientific Report	Big data: The Management I	Literature Revi	2012	McAfee A & Br	1_0			Big Data
22 CCIT IEEE Conintro Confermitie Article	Die deter Neue erstertunities	Literature Devi	2012	Michael K 8 M	22.24	40	c	Dia Data
22 SSIT, IEEE Society on Soc Scientific Article	Big data: New opportunities	Literature Rev	2013	Michael, K., & M	22-24	46	6	Big Data
23 Oracle White Paper Scientific Report	Big data for the enterprise.	Literature Revi	2012	Oracle	1-16			Big Data
24 Journal of Decision Syste Scientific Article	Leverage big data analytics f	Literature Revi	2016	Osuszek, L., Stan	436-449	25	2	Big Data + Decision Making
25 Mary Ann Liiebert Scientific Article	Data Science and its Relation	Literature Revi	2013	Provost, F., & Fay	51-59	1	1	Big Data + Decision Making
26 TDWI Best Practices Rep Scientific Report	Big data analytics	Literature Revi	2011	Russom, P	1-35			Big Data
27 Journal of Business Pase Scientific Article	Critical analysis of Dig Date	Literature Revi	2017	Sivaraiah II Ka	263, 206	70		Big Data
27 Journal of Basiness Rese Scientific Article	Circular analysis of Big Data (Literature Rev	2017	Sivarajan, U., Kal	203-200	70		
28 Business Information Re Scientific Article	Digital workplaces: Vision ar	Literature Revi	2012	White, M.	205-214	29	4	Big Data
29 Morgan Kaufmann Book Section	Big Data Analytics = Machine	Literature Revi	2016	Wu, C., Buyya, R	1-27			Big Data
30 Journal of World Busines Scientific Article	Managerial decision-making	Literature Revi	2011	Aharoni, Y., Tiha	135-142	46	2	Decsion Making + International
31 Business Management a Scientific Article	Strategic Decision Making: P	Literature Revi	2014	Ahmed, A. H., By	78-104	5	1	Decision Making + Strategic
22 The Journal of Strategic Scientific Article	Information technology str	Litoraturo Povi	2001	Andorson T J	101 110	10	2	Decision Making + Strategic + IT
32 The Journal of Strategic (Scientific Article	mormation technology, sti	Literature Rev	2001	Andersen, T. J.	101-119	10	2	Decision Making + Strategic + H
33 Journal of Management Scientific Article	Theoretical construct develo	Literature Revi	2010	Ashill, N. J., & Jo	1278-1308	36	5	Decision Makin+ Uncertainty
34 Management Decision Scientific Article	Toward a theory of evidence	Literature Revi	2012	Baba, V. V., & Ha	832-867	50	5	Decision Making + Information
35 Blackwell Handbook of JuScientific Article	Normative Models of Judgm	Literature Revi	2008	Baron, J.	19-36	4		Decsision Making + Model
36 Book	Decision makina: descriptive	Literature Revi	1988	Bell. David E.: Ra	iffa. Howar	d: Tv	ersk	Decision Making
37 Marketing Leters Scientific Article	Understanding managers' st	Literature Revi	1994	oulding W Mo	413-426	5	4	Decision Makig + Strategic
20 AACAI Advanced Critical Crimetific Article	Effective Decision Making	Literature Devi	2010	Dulana M	410 420	21	-	Decision Making - Strategic
38 AACN Advanced Critical Scientific Article	Effective Decision Making	Literature Rev	2010	Bylone, IVI.	130-132	21	2	Decision Making
39 Management Decision Scientific Article	Decision-Making for Interna	Literature Revi	1982	Cavusgil, S. T., &	47-54	20	4	Decision Making + International
40 Journal of Management Scientific Article	Strategic Decision Making	Literature Revi	1995	Charles R. Schwe	11-21	21	3	Decision Makig + Strategic
41 Journal of Management Scientific Article	Structure of marketing decisi	Literature Revi	2007	Chung, H. F. L.	635-648	23	7	Decision Making + International
42 Journal of Information M Scientific Article	he role of information in str	Literature Revi	2011	Citroen C I	493-501	31	6	Decision Making + Information
A2 Pook	Cognitive process models an	Literature Revi	1007	Crozior P. & Pa	257	51	Ŭ	Decision Making
	Cognitive process models un	Literature Rev	1997	Cruzier, K., & Ka	2.37			Decision Making
44 Enterprise Risk Manager Scientific Article	Decision Making Under Unce	Literature Rev	2009	Damghani, K. K.,	1-21			Decision Making
45 Operational Research So Scientific Article	Descriptive Decision Making	Literature Revi	1998	Dillon, S. M.	1-10	1		Decision Making
is operational nescaren so scientific Affilice	Descriptive Decision waking	Encertation e meth		- / -				
46 Journal of Evolutionary E Scientific Article	Substantive and procedural	Literature Revi	1991	Dosi, G., & Egidi,	293-305	10	7	Decision Making + Uncertainty
46 Journal of Evolutionary E Scientific Article 47 Administrative Science C Scientific Article	Substantive and procedural Characteristics of Organizati	Literature Revi Literature Revi	1991 1972	Dosi, G., & Egidi, Duncan. R. B.	293-305 313-327	10 17	7	Decision Making + Uncertainty Decision Making + Uncertainty
46 Journal of Evolutionary E Scientific Article 47 Admistrative Science C Scientific Article 48 Strataic Management J Scientific Article	Substantive and procedural Characteristics of Organizati	Literature Revi Literature Revi	1991 1972	Dosi, G., & Egidi, Duncan, R. B. Eisenbardt K. M	293-305 313-327 17-37	10 17	7 3	Decision Making + Uncertainty Decision Making + Uncertainty Decision Making + Strategic
46 Journal of Evolutionary E Scientific Article 47 Administrative Science (Scientific Article 48 Strategic Management J Scientific Article 40 Springer Vacha	Substantive and procedural Characteristics of Organizati Strategic Decision Making	Literature Revi Literature Revi Literature Revi	1991 1972 1992	Dosi, G., & Egidi, Duncan, R. B. Eisenhardt, K. M	293-305 313-327 17-37	10 17 13	7 3	Decision Making + Uncertainty Decision Making + Uncertainty Decision Makig + Strategic
46 Journal of Evolutionary E Scientific Article 47 Administrative Science C Scientific Article 48 Strategic Management J Scientific Article 49 Springer-Verlag London Book Section	Substantive and procedural Characteristics of Organizati Strategic Decision Making Defining and Identifying Unc	Literature Revi Literature Revi Literature Revi Literature Revi	1991 1972 1992 2009	Dosi, G., & Egidi, Duncan, R. B. Eisenhardt, K. M Grote, G.	293-305 313-327 17-37 11-27	10 17 13	7	Decision Making + Uncertainty Decision Making + Uncertainty Decision Makig + Strategic Decision Making + Uncertainty
46 Journal of Evolutionary E Scientific Article 47 Administrative Science C Scientific Article 48 Strategic Management J Scientific Article 49 Springer-Verlag London Book Section 50 KTH Scientific Report	Substantive and procedural Characteristics of Organizati Strategic Decision Making Defining and Identifying Unc Decision Theory	Literature Revi Literature Revi Literature Revi Literature Revi Literature Revi	1991 1972 1992 2009 1994	Dosi, G., & Egidi, Duncan, R. B. Eisenhardt, K. M Grote, G. Hansson, S. O.	293-305 313-327 17-37 11-27 1-94	10 17 13 19	7 3	Decision Making + Uncertainty Decision Making + Uncertainty Decision Makig + Strategic Decision Making + Uncertainty Decision Making
46 Journal of Evolutionary E Scientific Article 47 Administrative Science C Scientific Article 48 Strategic Management J Scientific Article 49 Springer-Verlag London Book Section 50 KTH Scientific Report 51 Management Decision I: Scientific Article	Substantive and procedural Characteristics of Organizati Strategic Decision Making Defining and Identifying Unc Decision Theory A process perspective on str	Literature Revi Literature Revi Literature Revi Literature Revi Literature Revi Literature Revi	1991 1972 1992 2009 1994 1996	Dosi, G., & Egidi, Duncan, R. B. Eisenhardt, K. M Grote, G. Hansson, S. O. Harrison, E. F.	293-305 313-327 17-37 11-27 1-94 46-53	10 17 13 19 34	7 3 1 3	Decision Making + Uncertainty Decision Making + Uncertainty Decision Making + Strategic Decision Making + Uncertainty Decision Making + Stategic + Prov
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