

Big data analytics for entrepreneurial orientation: Concepts, challenges and applications

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Abstract:

The purpose of this study was to explore the processes leading to achieving entrepreneurial orientation through big data analytics. In doing so, we used the narrative approach to analyse thematically the key elements of the events, and because we found it useful in gathering, summarising, and synthesising several numbers of literature on these concepts and their practice. Therefore, we tried to provide readers with a comprehensive background for understanding current knowledge and highlighting the significance of research in understanding these cognate areas. As the results of the study, this review identified the knowledges on what is available on entrepreneurial orientation and big data analytics, thus helping to inform future research in this area, particularly important questions needed to be resolved to make this research area attractive.

Keywords: Big Data Analytics; Entrepreneurial Orientation; Big Data; entrepreneurship; entrepreneur.

ملخص:

كان الغرض من هذه الدراسة هو استكشاف العمليات التي تؤدي إلى تحقيق التوجه الريادي من خلال تحليلات البيانات الضخمة. عند القيام بذلك، استخدمنا النهج السردى لتحليل العناصر الرئيسية للأحداث بشكل موضوعي ولأننا وجدناها مفيدة في جمع وتلخيص وتوليف العديد من الأدبيات حول هذه المفاهيم وممارستها. لذلك، حاولنا تزويد القراء بخلفية شاملة لفهم المعرفة الحالية وتبسيط الضوء على أهمية البحث في فهم هذه المجالات المماثلة. كنتائج للدراسة، حددت هذه المراجعة مجموعة المعارف حول ما هو متاح في توجيه ريادة الأعمال وتحليلات البيانات الضخمة، مما يساعد على إبلاغ البحث المستقبلي في هذا المجال، ولا سيما الأسئلة المهمة التي يجب حلها لجعل هذا المجال البحثي جذابًا.

الكلمات مفتاحية: تحليلات البيانات الضخمة؛ التوجه الريادي؛ البيانات الضخمة؛ ريادة الأعمال؛ المقاول.

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1. INTRODUCTION

One of the most valuable assets for contemporary organizations is data. Additionally, as organisations develop their digital presence, their supply chains generate a significant amount of data. Big data, unlike capital, is useless without the tools needed to draw deeper insights from it. The most knowledgeable managers who have a thorough comprehension of their data can use it to establish benchmarks for their company. Big data and predictive analytics assist businesses in cost-cutting, accelerating the production of goods, and developing new goods or services to address customers' shifting wants (Dubey, et al., 2020, p. 4).

Organizations must increase their entrepreneurial profile if they are to survive and perform successfully in today's marketplaces, which are characterized by high customer expectations, intense global rivalry, and a quickly changing technological landscape. Businesses with an entrepreneurial mentality are more likely to innovate, take risks to create novel and uncertain products, and act more quickly than their rivals to seize market possibilities. Creative and innovative organizations which open to new ideas see environmental changes as opportunities rather than threats. Additionally, because they are solution-focused, they exhibit a high level of desire to start collaborative development projects with their partners as well as a high level of willingness to stray from current methods (S. Arunachalam, Ramaswami, Herrmann, & Walker, 2018, pp. 744, 747).

Entrepreneurial orientation (EO) is generally defined as a company's proclivity to explore new market opportunities, and as such, it shows itself in a company's propensity to accept innovation, risk-taking, proactiveness, competitive aggressiveness, and autonomy (Lumpkin(2) & Dess, 1996). Therefore, entrepreneurial orientation denotes an opportunity-seeking approach that involves the process of exploring market segments that offer potential advantages to the company in the future. Firms with high degrees of entrepreneurial-oriented processes are skilled at generating novel organizational forms and industry configurations and are able to reshape market conditions to their advantage due to their emphasis on exploratory activities (Boso, Story, & Cadogan, 2013, pp. 710-711).

Big data analytics (BDA), along with associated applications, are one of the most significant emerging technologies, driving the advancement of information technology and influencing thought and behavior in the linked world of today. Big data analytics has provided significant new insights into the growth of sustainable

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entrepreneurship and innovation. Many businesses are investing in big data to stand out from the competition (Rowley C. , 2020).

Despite literature reporting the influence of big data analytics on improved operational performance; there has been little research on the relationship between entrepreneurial orientation and the adoption of big data (Dubey, et al., 2020). To address this gap this paper constructed a theoretical framework based on the Concepts, challenges, and applications for each one. This is done by posing the following problematic:

How big data analytics can be used for entrepreneurial orientation for organizations and individuals?

This problematic area will be the object of the current study. The purpose of this study was to explore the processes leading to achieve entrepreneurial orientation through big data analytics. In doing so, we used the narrative approach to analyse thematically the key elements of the events, and because we found it useful in gathering, summarising and synthesising a several numbers of literature on these concepts and their practice. Narrative approach is defined as “a specific type of qualitative design in which narrative is understood as a spoken or written text giving an account of an event/action or series of events/actions, chronologically connected” (Czarniawska, 2004). It is also, a study of experiences “as expressed, and it is a method of making the concept of a narrative key and presenting a certain phenomenon (Creswell & Creswell, 2016) (Seino & Ishizaki, 2021).

Therefore, our primary purpose is to provide readers with a comprehensive background for understanding current knowledge and highlighting the significance of research in understanding these cognate areas. By doing so, this review identified the knowledges on what is available on entrepreneurial orientation and big data analytics, thus helping to inform future research in this area, particularly important questions needed to be resolved to make this research area attractive.

2. Entrepreneurial orientation

The type of entrepreneurship needed for a creative economy encourages employment creation through the creativity of CEOs who possess an entrepreneurial spirit in addition to superior knowledge and technology. This entrepreneurial activity is crucial to the development of a venture business ecosystem (Kim, Choi, Jeon, & Kim, 2016).

Entrepreneurship is the process of uncovering and developing an opportunity to create value through innovation, regardless of the entrepreneur's location whether

it is in a new or existing company or available resources (human and financial). Entrepreneurship has been extensively studied, and the most plausible explanation is that it generously contributes to public policy objectives like economic development, job creation, technological innovation, increased productivity, and structural realignments (Sedkaoui, 2018).

In 1755, a book written by Cantillon was published posthumously entitled “*Essai sur la Nature du Commerce en Général*” which introduced the notion of entrepreneurship to political economy. Cantillon's idea of the entrepreneur, according to Schumpeter, adhered to the scholastic doctrine by emphasizing the role of “risk-bearing” directors of production, contrasting with the safety of salaried employees (Ebner, 2005). As reported by Drucker (1970) and Knight (1967), entrepreneurship is about taking a risk because: (1) It is the act of developing brand-new values that did not hitherto exist; (2) It is the act of founding new entities, particularly enterprises; and (3) It entails the development of new riches by putting novel ideas into practice. Entrepreneurship is an age-old idea, and both simple and intricate at the same time. It has attracted the attention of numerous scholars in a variety of disciplines, including management, and economics. However, there are new areas where entrepreneurship is becoming more significant over the previous few decades (Sedkaoui, 2018).

While the idea of entrepreneurship is by no means new, how entrepreneurs operate has changed dramatically over the past ten years (Sedkaoui, 2018). Subsequently, entrepreneurial orientation (EO) has become a main concept in the realm of entrepreneurship due to its acceptance and broad implementation (Lumpkin & Pidduck, 2021). Organizations must better anticipate market developments than their rivals to provide their clients with higher-quality services to gain more advantages. This process would accelerate the growth of global change and the transition from a traditional to an information society while taking into account new strategies for making the most use of new chances that would support the institution. Therefore, it is thought that having an entrepreneurial orientation is one of the modern techniques for fostering and maintaining an organization's growth. According to Rauch and Wiklund (2009), organizational strategy-making procedures that support effective and efficient entrepreneurial decision-making are represented by entrepreneurial orientation. It incorporates specific organizational-level behaviors that include risk-taking, performing self-directed activities, being innovative, and responding quickly and effectively to achieve more than their

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competitors in the marketplace, thereby enhancing organisational performance. Wherefore, the establishment of Entrepreneurial orientation has been cemented as a critical component of organizational success and as a means of launching superior performance. Additionally, it was argued that organizations with higher levels of entrepreneurial orientation are more likely to function well than those with lower levels (Brimah, 2020).

Entrepreneurial orientation is an approach used to make strategic decisions through innovation to turn opportunities into profits. Lumpkin & Dess (1996) developed five dimensions of entrepreneurial orientation are (Supardi, Pradipto, Barlian, Suprpto, & Pangaribuan, 2019):

1. **Autonomy:** Independent action by an individual or team aimed at bringing forth a business concept or vision and carrying it through to completion;
2. **Risk-taking:** Making decisions and taking action without certain knowledge of probable outcomes; some undertakings may also involve making substantial resource commitments in the process of venturing forward;
3. **Proactiveness:** A forward-looking perspective characteristic of a marketplace leader that has the foresight to seize opportunities in anticipation of future demand;
4. **Competitive aggressiveness:** An intense effort to outperform industry rivals. It is characterized by a combative posture or an aggressive response aimed at improving position or overcoming a threat in a competitive marketplace;
5. **Innovativeness:** A willingness to introduce newness and novelty through experimentation and creative processes aimed at developing new products and services, as well as new processes.

3. Big data analytics

The literature presents big data as ‘the next frontier for innovation, competition, and productivity’ and the “next big thing in innovation’. Big data, which is characterized by data variety, velocity, and volume, is capable of changing the innovation landscape by increasing the fit between consumer preferences and product features. In turn, big data’s main characteristics are capable of exerting a powerful influence on firms’ innovation performance (i.e., innovation effectiveness and efficiency). Ultimately, this effect has an impact on firm performance in the form of customer perspectives, financial returns, and operational excellence. Exploring the technological evolution of big data research is an effective way to enhance technology management and create substantial value for research and

development strategies in both government and industry. With a significant role in emerging technologies, big data is associated with a series of technological developments in the area of data storage and data processing. These developments have heralded the rise in big data analytics, including all hardware and software techniques that can be used to analyse large-scale and complex data for real-world applications (Rowley C. , 2020).

3.1 Big data

Large datasets that cannot be gathered, stored, managed, or analyzed by conventional computing tools are referred to as "big data." These huge data -not only in size- but also in heterogeneity and complexity - sets include operational, transactional, sales, marketing, and other types of structured, semi-structured, and unstructured data. Big data also contains information that is available in a variety of formats, including text, voice, video, image, and more. 90% of all data is now unstructured, which is expanding faster. Therefore, in order to obtain data insights that improve decision-making, new types of processing capabilities are needed. The issues on the data life cycle can be categorized into three groups: data, process, and management challenges (Fig. 1) (Vassakis, Petrakis, & Kopanakis, 2018).

Big data characteristics including volume, velocity, variety, and validity are referred to as data challenges. Process challenges are related with the methods required for big data gathering, integration, transformation, and analysis in order to derive insights from the large data are related to process issues. The data management challenges also include issues with cost and operating expenses, governance, and data security and privacy. The seven Vs—volume, variety, veracity, velocity, variability, visualization and value—can be used to describe big data. Volume describes the large size of the datasets. It is a proven fact that the rapid growth of information and communication technologies (ICTs), including artificial intelligence (AI), in conjunction with Internet of Things (IoT) through the expansion of linked smartphones, sensors, and other devices has contributed to the enormous generation of data (counting records, transactions, tables, files etc.). Exabytes, zettabytes, and yottabytes are new measurements for data storage that were introduced as a result of the volume of data generation, which is exceeding Moore's law in terms of speed. The range of data creation sources and data formats is represented by variety. Web 3.0 encourages the expansion of social media and web networks, which produces a variety of data types. From SMS, GPS, and messages posted on social networking sites like Facebook or Twitter to updates,

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images, and videos (Vassakis, Petrakis, & Kopanakis, 2018)

Variability is often confused with variety, but variability is related to the rapid change of meaning; for instance, words in a text can have different meaning according to the context of a text. Big data is characterized by the high speed of data generation. This speed is extremely significant for enterprises in taking various actions that enable them to be more agile, gaining a competitive advantage against competitors. The veracity of data refers to data reliability and accuracy. Data visualization is the science of visual representation of data and information that presents quantitative and qualitative information in some schematic form. The leverage of big data can provide valuable knowledge. Thus, the value offered by the data analysis process can benefit enterprises, organizations, communities, and consumers (Vassakis, Petrakis, & Kopanakis, 2018).

Figure 01: Challenges in data lifecycle



Source: (Vassakis, Petrakis, & Kopanakis, 2018)

3.2 The concept of big data analytics

Analytics, as we all know, is the process of deriving conclusions and locating insights from a large collection (Hirve & Pradeep Reddy, 2019). Business intelligence, artificial intelligence, and management information systems all include the field of these analytics. According to Davenport (2013), there have been three stages in the evolution of analytics: Analytics 1.0, or the era of business intelligence; Analytics 2.0, or the era of big data; and Analytics 3.0, or the era of data-enriched offerings. The growth of user- and customer-generated data over the past 20 years, along with the development of fixed and now mobile Internet infrastructure, have raised the requirement for flexible, service-oriented decision support systems (Erikssoni, Westerlundii, & Rosenbröijeriii, 2014).

Researchers and practitioners need to think about how they may incorporate the adoption of cutting-edge technology into their competitive strategies given the rapid development of big data over the past several years. The use of big data in

business decision-making has recently attracted a lot of attention, and more companies are investing in big data analytics to boost their performance and competitive advantage. Techniques and technologies for storing, analyzing, and displaying data are necessary to fully capitalize on the rapidly increasing data volume, velocity, and diversity, but there has been considerably less study attention on how organizations may embrace these technologies for further improvement. Big data requires a cost-effective and cutting-edge information analysis technique to capture insights for decision-making because it has a large volume, high velocity, and high variety of raw information (Maroufkhani, Wagner, Wan Ismail, Baroto, & Nourani, 2019). For improved comprehension and data exploration, the insights gleaned by analytics should be made available to end users using the application platform in the form of visual representation techniques like reports, line graphs, and bar charts (Hirve & Pradeep Reddy, 2019).

Therefore, the topic of big data analytics arises when the concern is analyzing raw data that has not yet been used or from which hidden information has not also been extracted (Erikssoni, Westerlundii, & Rosenbröijeriii, 2014). The process of querying, simplification, and insight extraction from the big data set integrated into the file systems of the Big Data framework is known as big data analytics (Hirve & Pradeep Reddy, 2019). Big data analytics is described as "the process of gathering, organizing, and analyzing massive datasets (referred to as big data) to uncover patterns and other important information." Big data analytics refers to the collectively referred-to processes that transform big data into c interpretable and potentially actionable sets of information that can confer a competitive advantage. Big data analytics have drawn attention since it has been demonstrated that they have the power to produce innovative, trustworthy, and useful insights about the world we live in (Garattini, Raffle, Aisyah, Sartain, & Kozlakidis, 2019).

Because of its superior capacity to gather vast quantities of unprocessed data and utilize the best analytical techniques to measure it, big data analytics is now thought to be the most popular technique for studying big data (Maroufkhani, Wagner, Wan Ismail, Baroto, & Nourani, 2019). Big Data analytics is a relatively new concept and phenomenon that has arisen as a result of the Internet's role in the digital revolution, where users continuously produce massive amounts of data. Organizations are now able to use the data in their daily business operations because of the growth of data, cloud platforms, and innovative analytics tools (Erikssoni, Westerlundii, & Rosenbröijeriii, 2014).

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Big data analytics has evolved into a tool that businesses use to collect various types of data and apply automatic data analytics to make appropriate judgments that previously relied on the judgment and views of decision-makers. Thus, the three main components of big data analytics are the data itself, the analytics that are done to the data, and the way in which the results are presented so that commercial value may be created for companies and their clients. More businesses are considering adopting big data and business analytics to evaluate accessible data for (1) improving their products and services, and (2) supporting smart decision-making. In order to have a competitive advantage in the market, firms must fully utilize big data and business analytics (Maroufkhani, Wagner, Wan Ismail, Baroto, & Nourani, 2019). Only the equally quickly developing field of big data analytics is able to support the exponential accumulation in the gathering, and processing of big data. These analytics also provides the ability to reason, comprehend, and utilize big data for a variety of purposes, from production modeling to results in predictions (Garattini, Raffle, Aisyah, Sartain, & Kozlakidis, 2019).

4. Big data analytics for entrepreneurial orientation

Small and medium-sized businesses are regarded as the foundation of any emerging economy. However, due to poor performance, small and medium-sized businesses in several developing nations have a low growth rate. Traditional methods are to blame for poor performance, but the world is heading toward digitization which has become necessary in the current digital world in which big data is of great importance (Asad, Asif, Khan, Allam, & Satar, 2022). It is impossible to overstate the link between big data analytics and the growth of entrepreneurship. Big Data analytics has tremendous potential for generating value for enterprises, especially when properly matched with operational requirements and learning needs. It can result in a major improvement in the entrepreneur's performance and decision-making abilities. Big data analytics offers insightful information that can help with decision-making, particularly when spotting patterns and utilizing new algorithms (Figure 2.). This opens up new business opportunities for entrepreneurs by teaching them how to deal with the challenges of big data and preparing them to collect, process, store, and manage vast amounts of available data (Kerry & Jemitola, 2019).

Most ambitious entrepreneurs might not be familiar with the industry they should enter when beginning a company. To better their entrepreneurship development, individuals can effectively study and analyze their preferences using

Figure 02: How data enable accurate decision-making to entrepreneurial orientations



Source: (Sedkaoui, 2018)

Big Data analytics data, nevertheless. In order to develop newer and better products, business owners employ big data analytics to identify defects in their products, customers, and suppliers as well as consumer intent and preferences (Kerry & Jemitola, 2019). In the modern world, entrepreneurs that are most knowledgeable and have a profound understanding of data set benchmarking guide their companies to great success. Big data analytics may also be helpful because it will be what drives enterprises in the future. In order to acquire a competitive advantage, SMEs in developing economies invest in emerging technology. Thus, it would be fitting to say that competitive advantage is the missing link in total performance when entrepreneurial orientation and big data analytics are coupled (Asad, Asif, Khan, Allam, & Satar, 2022).

Big data is an element that is currently gaining enormous relevance together with entrepreneurial orientation in order to they are important for gaining a competitive advantage and improving performance, according to the literature on performance in industrialized countries. Due to engagement in the growth and success of the enterprises and their ability to manage big data collected from consumers and the market, big data analytics and entrepreneurial orientation which is a component of strategic orientation, and have an impact on SMEs' performance (Asad, Asif, Khan, Allam, & Satar, 2022).

Big data analytics skills can help companies become more entrepreneurially minded, and entrepreneurially oriented companies are more likely to be able to use these capabilities to create value. Therefore, entrepreneurial orientation provides an explanation of how big data analytics affects performance. According to Darwis (2017), one of the crucial elements that integrates, builds, and reconfigures the

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internal and external capabilities to react to aggressive and hypervolatile market conditions is entrepreneurial orientation. The organizational capability required to use the resources that big data analytics capability can provide in boosting competitiveness can be facilitated by entrepreneurial orientation. Entrepreneurial businesses must see future opportunities and challenges as well as the current business environment in order to prepare proactively arrange innovative solutions and take the required risks before it is too late. By providing rapid and accessible access to varied business-related information that was unavailable before the advent of big data technology, big data analytics platforms can improve the organization's capacity to develop these innovative solutions. Businesses can identify and evaluate new patterns and market trends when they have more access to structured and unstructured information. Information is required for developing innovative goods and services as well as for identifying and pursuing new markets. In summary, organizational agility and IT-related capability are crucial for achieving sustained competitive advantage, especially when a company has a more entrepreneurial orientation (Al-Darras & Tanova, 2022).

As an answer to the problematic of this study, Big data analytics can be used for entrepreneurial orientation for organizations and individuals through three areas presented by the previous studies that were available to us, namely: (1) entrepreneur, (2) sustainable entrepreneurship, and (3) Entrepreneurial orientation and adoption of big data analytics.

4.1 Big data analytics advantages for the entrepreneurs

It is evident that understanding how entrepreneurs are allocating their resources to engage with and apply analytics tools and methodologies in their businesses, as well as their role in determining the entrepreneurial culture, will help better understand their potential to adopt big data analytics. More and more information about the environment in which it functions or will operate is crucial for them. Entrepreneurs must keep innovating and offer a broad popularization of the changes in businesses brought on by the emergence of corporate digitization in order to decode the profit of big data. By adopting a new way of working or changing with a more advanced set of competencies that cover the necessary areas, entrepreneurs can improve their learning process and become better at applying a variety of data analysis approaches. Education that incorporates big data analytics for it to be effective, it must combine (Sedkaoui, 2018):

- Predictive and prescriptive analytics to foretell the future and prescribe actions

to take to make it happen;

- The use of analytics and related technologies to boost decision-making efficiency and create value; and
- Making use of cutting-edge technologies and methods that assist in managing and extracting pertinent facts from large data.

There will be many opportunities to create entrepreneur businesses that will successfully and efficiently meet the needs of many organizations thanks to the use of big data analytics and IT solutions, such as clouds. Advanced analytics provide a deeper understanding of the data while basic analytics (descriptive) only provides a brief summary. Descriptive analytics uses historical data to report, visualize, and comprehend previous events. In order to comprehend why something occurred or to make predictions about what will happen in the future under various conditions, predictive analytics makes use of historical data. And prescriptive analytics, shown in Figure 2 as advanced analytics, chooses the decision or action of action that will result in the best outcome given a certain set of goals and restrictions. Therefore, the focus should be on developing a success plan that includes the following stages (Sedkaoui, 2018):

- Establish entrepreneurial directions in the context of data analytics by defining its mission, vision, and operational and strategic goals;
- To control the use of ICT and big data, the following should be taken: establish policies, principles, resources, and expertise guidelines;
- Evaluate and analyze the current conditions and the changes and additions required to achieve the desired result;
- Identify priorities and use them to determine the most crucial elements and techniques that would display the greatest effects with the least investment; and
- Realize new opportunities for further development by monitoring current analytics and the arising issues and modern requirements.

Then, it's essential to incorporate sufficient funding and resources to assist entrepreneurs' usage of analytics. To fully profit from big data and achieve all anticipated features and capabilities, this investment is necessary. It is advised to incorporate some following activities into the process to help optimize the work and reduce the expenses of such projects (Sedkaoui, 2018):

- Before deciding whether to accept big data, companies need first understand what it can be used for;
- Creating analytics tools to aid in foreseeing prospective issues and predicting

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probable changes;

- This will assist in avoiding or at least minimizing some risks associated while also assisting in cost savings;
- using the knowledge of previous entrepreneurs' experiences to follow good models and steer clear of bad ones; and
- combining open data and big data. This can aid in optimizing various processes and making better decisions.

Big data analytics integration can benefit entrepreneurs in a variety of ways, including (Sedkaoui, 2018):

- **Decision support:** entrepreneurs can use huge amounts of data that are pertinent to their specific business. As a result, they would have to filter the data in accordance with their own requirements and extrapolate meaning from the data that best suits them. This will increase their knowledge of their own field and enable improved decision-making, which will enhance operational efficiencies;
- **Reduce cost:** Big data has been discovered to be incredibly useful for enhancing the current corporate architectures. Additionally, the likelihood of incurring losses is reduced when more accurate decisions are taken. Therefore, analytics startups and business owners can successfully reduce their operational costs, which is often one of the largest obstacles for any fresh venture;
- **Customer insights:** How well a firm designs its products and services while taking into consideration the preferences, likes, tastes, and other factors of its customers will determine how successful it is. Big data analytics can assist businesses in gaining access to the necessary and pertinent data. Social media, for instance, is a terrific instrument for gathering and assimilating massive amounts of client insights and can be utilized to gather data for this purpose effectively; and
- **Open data uses:** The perceived usage of open data by entrepreneurs to develop new goods and services has grown over the previous year. In addition to its potential for generating new economic activity, open data also involves a philosophical decision or ethics. They are also a part of the people whose behaviors are measured since they encrypt collective human behavior. The availability of data to a communication orientation is the foundation of this phenomenon's culture.

4.2 Big data analytics and sustainable entrepreneurship

Big data analytics, along with associated applications, are one of the most significant influential emerging technologies, driving the advancement of information technology and influencing thought and behavior in the interconnected world of today. Big data analytics has provided significant new insights into the growth of sustainable entrepreneurship and innovation. Many businesses are making investments in big data in an effort to stand out from the competitors. Big data is portrayed in the literature as the "next big thing in innovation" and as "the next frontier for innovation, competition, and productivity." By improving the match between customer preferences and product characteristics, big data, which is characterized by data variety, velocity, and volume, has the power to alter the innovation landscape. In turn, big data's core characteristics have the potential to have a significant impact on how well businesses innovate (i.e., innovation effectiveness and efficiency). In the end, this effect leads to achieving the company's performance in terms of its operational excellence, financial results, and customer perceptions. An efficient strategy to improve technology management and create significant value to research and development initiatives in both government and industry is to explore the technological evolution of big data research. Big data is linked to a number of technological advancements in the field of data processing and storage, playing a vital role in emerging technologies (Rowley C. , 2020).

As a result of these developments, big data analytics—which encompasses all hardware and software methods that may be used to analyze massive amounts of complicated data for practical applications—has become more popular. This is thought to be a Pandora's box for business owners. Entrepreneurship can manifest many different forms, including economic growth, productivity, the development of new technologies and products, market change, the preservation of foreign trade terms, development, the efficient use of domestic resources, improved enterprise cooperation, and the equitable distribution of wealth throughout society. on the other hand, academics are quite interested in the connection between big data and sustainable entrepreneurship. Innovation, entrepreneurship, and knowledge have all been explored in conjunction as the cornerstones of economic growth and competitiveness. Working with big data and implementing data analysis techniques call for strong cross-disciplinary abilities and expertise in a variety of topics, including statistics, econometrics, computer science, data mining, law, and business ethics. Big data and the application of data analytics are becoming increasingly

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popular, particularly in businesses searching for fresh approaches to build out smarter capabilities and address challenges in dynamic processes. The development of new analytics techniques is necessary to uncover fresh approaches to data analysis and more intelligent. In the big data era, data analytics has encouraged entrepreneurship and the emergence of data entrepreneurs, leading to significant shifts in firm-level entrepreneurship (Rowley C. , 2020).

4.3 Entrepreneurial orientation and adoption of big data analytics

The capacity to employ big data analytics powered by artificial intelligence (BDA-AI) to better understand client intentions or behaviors is crucial for maintaining a competitive advantage in today's dynamic market conditions. According to Zhai et al. (2018) entrepreneurial orientation "may describe the performance of style, decision, and action in the process of the company's business plan". Although the organizational core philosophy frequently echoes the entrepreneurial behavior displayed by the organization, the entrepreneurial orientation is concentrated on how organizations do their business. Wu (2007) says that one of the most important main organizational resources that aids organizations in adapting to dynamic environments are entrepreneurial resources. To acquire a major competitive edge, big data analytics with artificial intelligence (BDA-AI) enabled dynamic capabilities are essential (Dubey, et al., 2020).

Additionally, an entrepreneurial orientation involves endeavors like innovation, opportunity exploration, and efficient resource utilization. In light of this, (Dubey, et al., 2020) contend that both an entrepreneurial orientation and big data analytics powered by artificial intelligence (BDA-AI) authorized dynamic capabilities to enable organizations to promote operational performance by developing new products or services, improving product or service quality, lowering costs, and lowering the market risk of new products or services innovation. According to Wilkund and Shepherd (2005), organizations must use big data analytics powered by artificial intelligence (BDA-AI) enabled dynamic capabilities in order to reduce the market risk of new innovations as well as to extract enough value from them in order to cover for the high cost of innovation and to generate higher-than-accustomed profits for the company. According to Miller's (1983) arguments, innovativeness, proactivity, and risk-taking are the three primary traits that entrepreneurially oriented organizations have that allow them to strategically navigate through the streams of innovation, new technologies, and new customer trends. Therefore, (Dubey, et al., 2020) propose that these characteristics

of entrepreneurially oriented organizations can significantly affect the organizations' decisions to invest in developing organizational resources that support (BDA-AI) capabilities.

5. CONCLUSION

The intent of this paper is to provide a basic understanding of what big data and entrepreneurial orientation are, and it highlights also the importance of analytics and the role it plays as a complement to the creation of new opportunities for entrepreneurs to provide new products and services and to make decision-based on data. Entrepreneurial orientation (EO) refers to organisations' tendency to explore new market opportunities via building capabilities including innovativeness, risk-taking, proactiveness, competitive aggressiveness, and autonomy. On the data life cycle the challenges can be divided into three categories: data, process, and management challenges.

Big data analytics (BDA) helps organisations reduce costs, make products faster, and create new products or services to meet customers' changing needs. Data analytics in the big data era has stimulated entrepreneurship and the rise of data entrepreneurs, resulting in major changes in entrepreneurship among firms. big data analytics can generate many advantages for the entrepreneurs, such as: Decision support, Reduce cost, Customer insights, and Open data uses. Organisations need to leverage big data analytics dynamic capabilities not only to reduce the market risk of new innovations but also to extract enough value from them to cover the high cost of innovation and to provide higher-than-usual profits for the firm.

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