

STRATEGIES FOR IMPLEMENTING BIG DATA CONCEPT IN THE CONSTRUCTION INDUSTRY OF THE DOMINICAN REPUBLIC

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ABSTRACT: *The Big Data (BD) boom has increased exponentially in recent years, reaching even the most traditional industries. In construction, this technology has come to be considered as the possible solution to the challenges that the industry has been facing in recent years, with some authors even naming this technology as the future of the construction industry. However, despite this reception, studies that explain in detail the factors that favour the adoption of Big Data are scarce and non-existent in some cases. Understanding these influencing factors is a key element in ensuring future technology adoption across the industry. Such is the case of the strategies which make up an action plan for companies that seek to adopt Big Data in the future. Therefore, the objective of this study is to identify the strategies that would allow the adoption of Big Data in the construction industry of the Dominican Republic. To identify these strategies, qualitative research was carried out due to the scarcity of sources that address the subject. In the data collection process, a total of 21 interviews were conducted representing companies with undoubted presence in the construction market of the Dominican Republic. As a result of the data analysis, four main strategies were identified which include the promotion of standardization and popularization of the BD concept and its benefits, investment in training and development of staff skills, support for the development of current technologies as well as the inclusion of technology in the education curriculum of present and future professionals. These strategies identified in the study will help companies that plan to implement Big Data in the future to carry out an action plan and identify the steps to follow to achieve a successful adoption of the technology. Also, this study contributes to the body of knowledge of research professionals who focus on the elements for Big Data adoption as well as possible future professionals in the area.*

KEYWORDS: *Big Data, Construction, Dominican Republic, Strategies, Technology.*

1. INTRODUCTION

Construction industry has remained the same during the last decades, construction methods have varied or little or nothing during this time despite the great technological advances presented by other industries, the resistance to change of this industry implies that the small changes that have occurred such as the adoption of BIM, IoT and smart devices have occurred gradually and many years after similar advances have occurred in other areas (Silverio Fernandez et al., 2019). Nevertheless, there are more and more technological advances that arise aimed at the construction industry (Bello, 2021; Nik-Bakht et. al., 2021 and Naoui et. al., 2021), the increased awareness of the limited resource availability and the impact of the construction practices in the environment and the future generations have led the industry to adopt tools aimed at mitigating if not eliminating these impacts (CLC, 2021)

Big Data (BD) is a technology which has emerged as a response to the need to manage the increasing volumes of data that are currently generated and transmitted (Sayah et al., 2021 and Tamiminia et al., 2020). This technology is characterized by providing the tools for efficient decision-making through the identification of trends and patterns that help to improve production processes (Tabesh et al., 2019). Industries such as retail, banking and healthcare have been taking advantage of the benefits provided by technology for years, but in other cases industries such as manufacturing, and construction are just beginning to explore their potential (Tabesh et. al., 2019 and Chen et. al., 2020). However, the successful adoption of this technology depends in large part of the

industry's ability to integrate new technologies which represents a disadvantage for the construction industry which tends to adhere to traditional practices (Silverio Fernandez et al., 2019).

On the other hand, the effects of BD in the sustainable development of the industry are evidenced in applications aimed at the efficient use of energy and resources, as well as the elimination of waste during the construction processes to mention a few (Lu, 2019; Xu et. al., 2020; and Lu et al., 2021), so the integration of this technology in the construction processes would imply an advance for the industry and a chance to meet the future requirements of the world.

- 2. A determining factor in the adoption of new initiatives is the need for well-based strategies, companies have to establish clear objectives as well as responsibilities. In order to implement any new initiative companies, require well-based strategies where the aim and responsibilities are clearly expressed (Wattananajtra, 2020). Because of this the aim of this study is to explore the strategies for implementing BD in the construction industry based on the expertise of Dominican decision makers. Since the construction industry is only beginning to acknowledge BD and its impacts in the industry, an extensive literature review showed that some information can be found regarding some new implementation cases but there is no concrete information on the strategies necessary to achieve such adoption so this topic will be explored through qualitative research which is explained in the methodology section of this paper. Prior to it, the theoretical background of the research is presented.****THEORETICAL BACKGROUND**

Big Data can be considered as any dataset that because of its size or complexity requires nontraditional tools for its management and analysis (Miloslavskaya & Tolstoy, 2016 and Liu, 2015). This heterogeneous dataset possesses four main characteristics that ideally should always be present. These characteristics are Volume, Velocity, Variety and Value, better known as the 4V's of BD (Tabesh et al., 2019). Global BD adoption grows exponentially with each passing day, for 2021 the BD market is expected to reach around 99 billion dollars Kulkarni (2021). According to Davenport and Bean (2019). 97.2% of companies are already investing in BD and AI. This mainly because the benefits of BD adoption have been proven over and over during recent years throughout most industries (Chen et al., 2020; Rabhi et al., 2019; Tabesh et al., 2019), benefits such as improved decision making, and increased revenue (Bange et. al., 2015) are some effects of implementing BD in businesses.

2.1.Early Stages of Big Data in Construction

The construction industry currently faces many challenges that cost the world economy about \$ 1.6 trillion a year, lack of efficiency, low productivity and safety issues are some of the problems that arise in the industry and what projects must face on a daily basis (Yousif et. al., 2021). Meanwhile, the amount of data generated by construction projects keeps increasing (Chen et al., 2020 and Caesarius and Hohenthal, 2018).

The overall benefits of BD implementation offer a direct solution to the problems faced by the industry which is evidenced by the rising amount of BD adoption by construction companies around the world (Hwang et al., 2021). Nowadays, BD is being applied in every stage of the project lifecycle providing improved decision-making and benefiting all stakeholders (BIGRENTZ, 2021). Authors Wong (2020) and Morrison (2021), list some of the most important impacts produced by the adoption of BD in construction, these impacts are presented in the following figure (Figure 1).

Efficient Management

- BD can make more accurate time estimations with stronger algorithms to reduce wasted time and improve project efficiency.

Accurate budget estimates

- The more data that becomes available, the better predictions can be made for future budget estimates.

Lower Project Risk

- More in-depth insights and better data.

Increases Building Efficiency

- Data analytics technology works to reduce construction time and material-related costs by presenting clear, digestible data and identifying potential structural errors before they happen.

Reduces Environmental Impact

- Construction data from past projects can be integrated into BIM technology to more accurately predict the materials and energy needed for a future project.

Improves Working Conditions

- Technology like smart construction wearables and safety management software is quickly gaining traction in the industry.

Sustainability

- BD can help reduce waste, which will improve the industry's environmental footprint. Similarly, as crews work faster, they'll run fossil-fuel-powered machinery for less time, decreasing emissions.

Figure 1: Impacts of BD implementation in Construction Projects.

Source: Adapted from Wong (2020) and Morrison (2021)

Many sources such as Burger (2019) and Wong (2020) agree in the increasing value of BD in daily life as well as in the construction industry where the added value received in the form of better decision making and improved project efficiency makes this technology to be considered by many as the future of construction. However, both authors also agree that to benefit from BD a high level of skills is necessary, since, by themselves, large volumes of data do not represent great benefits, while with the right knowledge and tools it is possible to take advantage of all the advantages that technology offers.

2.2.Strategies for implementing new technologies in Construction

According to Wattananjana (2020), the development of a well based strategy is a key element in the adoption of new initiatives, technologies like BD are not the exception. Even though every day more studies are emerging focused on the implementation of BD in construction, there is still no clear path that indicates the steps to follow for a successful adoption, elements such as critical success factors and strategies have not been the focus of these new studies. Therefore, due to the lack of sources that identify the particular case of strategies for the implementation of BD in the construction industry, this study will use as a basis the strategies identified for the implementation of new technologies in general. Hwang et. al. (2021), makes a compilation of these strategies which have been summarised in two main areas government-oriented strategies and organization-oriented strategies and are presented in the table below (Table 1).

Table 1: Strategies to promote adoption of smart technologies

Government Oriented Strategies

Organization Oriented Strategies

Training of skilled workforce	Communication and change management
Government incentives	Partnership
Establish standards	Top-down leadership
Showcase of successful case study	Clear organization structure
Promoting knowledge management for smart technologies	Staff training and development

Source: Adapted from Hwang et. al., 2021.

These strategies identified in the aforementioned study (Hwang et. al., 2021), will serve as a point of comparison for the primary data collected during this investigation.

2.3.Dominican Republic as a Focus Point

The construction industry plays an important role in the economy of many countries, such is the case of the Dominican Republic where it contributed around 12% of its GDP in 2019 (Central Bank of the Dominican Republic, 2020), and a contribution of around 57% to the nation's economic growth after the effects of the COIVD-19 pandemic (Valdez Albizu, 2021). Moreover, DR's economy is considered by The World Bank (2021) as one of the most important in the region. Also, the DR has been ranked in multiple occasions by the Economic Commission for Latin America and the Caribbean (CEPAL), as the highest economic growth of the region (UN, 2019), which indicates that the results of this research could be representative of other industries in the region with similar characteristics.

Within its national development strategy (NDS) which seeks to provide the guidelines to achieve the sustainable development goals (SDGs) the Dominican Republic developed objectives such as improvement of quality of life that are directly related to the construction industry through the provision of infrastructure, low-cos housing and basic need services to mention a few (MEPYD, 2017). These SDGs approved by the member states of the UN in the agenda 2030 of 2015 (UN, 2015) highlighted the importance of sustainable construction practices (Yousif, et. al., 2021) and therefore, the adoption of technologies such as BD that could help the country's industry could help with its achievement.

Moreover, in the country there is evidence of studies that explore the implementation of BIM (Silverio Rodriguez, 2020) and the use of Smart Devices (Silverio-Fernandez et. al., 2019) in the industry, where both serve as a basis for a future implementation of BD since their adoption implies the existence of a data generation and transmission structure and according to Tamiminia et. al. (2020) is one of the very reasons the technology emerged in the first place.

Finally, this study as a part of a bigger exploration of the Implementation of BD in the construction industry of the DR could help identify the strategies for implementing this and other similar technologies that would benefit an industry in need of modernization.

2.4. Research Scope and Gap

Big Data has been identified as a possible solution to the needs of the construction industry, this data driven technology provides benefits that would ensure the much-needed sustainable development of the industry as well as its modernization (Vellante, 2021). However, the proven resistance to change and the technological drive required by the technology makes its adoption not a safe bet, this combined with the lack of clear guidelines on adoption makes the implementation of BD and uphill battle (Ngo et al., 2020).

Despite becoming the aim of a great number of studies such as Mourtzis et. al., (2016); Wu et. a., (2017); Raguseo, (2018); Caesarius and Hohental, (2018); Silva et. al., (2019); Salleh and Janczewski, (2019); Baig et. al., (2019); Knowles, (2020); Balti et. al., (2020); Bag et. al., (2021); and Aversa et. al., (2021), to mention a few, none directly addresses the key factors for implementation, particularly no studies were found that explore the strategies implemented in the adoption of the technology, nor is there detailed documentation of implementation cases outside of North America and Asia.

Also, the construction industry's adherence to traditional practices makes the process of adopting new technologies inefficient and requires in-depth knowledge of them (Silverio-Fernandez et. al., 2019). Therefore, the main objective is to explore the understanding of BD technology and the elements that would enable an industry wide adoption, with this study focussing on this last part by exploring the strategies that industry decision makers understand are essential for implementation.

By identifying the strategies for implementing technologies such as BD in the construction industry of the Dominican Republic this paper provides possible guidelines for adopting this and other technologies and that could also be replicated in other environments.

3. RESEARCH METHODOLOGY

This section details the methodology used to carry out this research, the results of which will be presented in the following section. Even as the number of cases of big data implementation in construction continues to increase, sources detailing the basics on how to achieve this adoption are scarce (Creswell, 2017). This fact directs the research towards the qualitative approach which facilitates a deep exploration of an issue that otherwise could not be addressed with another type of methodology (Busetto et. al., 2020). This phenomenon is better known as the principle of data availability (Kumar, 2014).

The information on which this study is based was collected through the performance of 21 semi-structured interviews in the construction industry of the Dominican Republic between the months of October 2019 and March 2020. These interviews were performed to decision-making representatives of medium and large companies with undoubted presence in the Dominican Republic market, this in order to ensure that they have both the knowledge and the possibility of adopting the technology in the future. The following figure (Figure 2) summarizes the research design process carried out in this study.

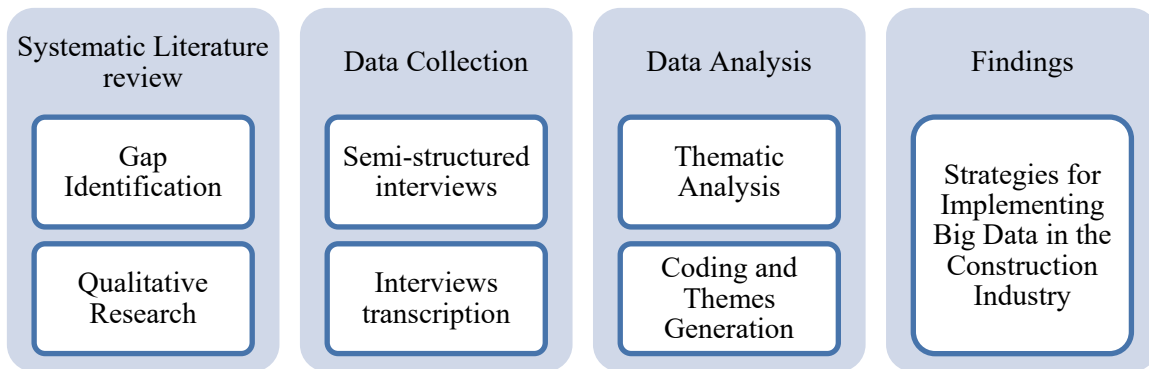


Figure 2: Research Design

3.1.Design of the interviews

The interview used to collect the information was aimed firstly at exploring the level of knowledge of the participants about Big Data and then exploring the different factors that could influence its implementation. one of these factors is the focus of this study which explores the strategies that according to the professionals of the area are necessary for the future industry-wide implementation of the technology.

The need to collect consistent data that would allow in-depth exploration of the topic suggested the adoption of semi-structured interviews as a capture method (Cohen and Crabtree, 2006), in addition to the fact that this method is characterized by capturing the participants' point of view which is one of the objectives of this study (DeJonckheere and Vaughn 2019).

In the section of the interview addressed in this study the participants were asked to describe the strategies that could allow the adoption of technologies such as Big Data in construction at both organisational and industrial level, to determine if the difference exist between the strategies for implementing the technology in the two levels.

3.2.Sampling and data collection

Two defining factors were identified during the literature review, which would directly affect the study sample. In first place, the size of the company was determined as a key element for the adoption of new technologies, indicating that this occurs mainly in large companies (Ngo, et. al., 2020 and Maroufkhani et. al, 2020), and in second place the input from decision makers it is vital not only to provide the required information but also to promote the adoption of the technology in the future. The consideration of these factors in the selection of the

sample makes the method used non-probabilistic, which, according to McCombes (2019) is characterized in the use of some criteria for the selection of the sample.

To pinpoint the participating companies the “General Law of Commercial Companies and Individual Limited Liability Companies” (Congreso Nacional de la Republica Dominicana, 2008) was consulted where the official classification system for companies in the Dominican Republic is detailed. This system classifies the companies in four categories: Micro, Small, Medium, and Large companies, according to their size, number of employees, active capital and revenue.

At the end, to participate in the study, medium and large-sized companies from the construction industry of the Dominican Republic were contacted, while the selection of participants was made according to the position they occupy in the company, making sure the participants were construction professionals with experience and within the areas of management and decision-making of their respective companies.

The interviews were performed in Santo Domingo, D.R., between October 2019 and March 2020. The interviews were captured using voice recordings and lasted between 9 and 22 minutes approximately. Lastly the size of the sample was determined by using the saturation method, which indicates that the number of interviews is sufficient when new information is no longer perceived, and only information similar to that which is possessed is being obtained (Hitchings and Latham, 2020). The literature indicates that in semi-structured interviews saturation is usually reached between 15 and 20 interviews (Crouch and McKenzie, 2006), in this studio it was reached around 19 interviews were reached and two more were carried out as a safety factor.

3.3.Data Analysis

For the analysis of the information collected, the thematic analysis method was used, which consists of the identification of patterns and themes within the analyzed data through a six-step systematic method (Figure 3) (Caufield, 2019).

First, to prepare the data for the analysis Creswell's method for interviews for analysis was partially applied, which consists in the transcriptions of the audio interviews, followed by the preparation and iterative review of transcripts (Creswell, 2013). Also, in this study it was necessary to add another step of translating the interviews from the original Spanish language in which they were perform.

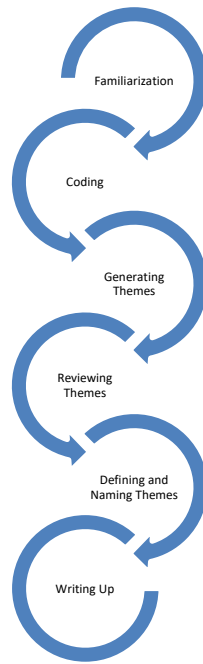


Figure 3: Thematic analysis process.

Source:

Adapted from Braun et. al., (2019).

According to Caulfield (2019), the selected thematic analysis is especially applicable to interview transcripts, since the iteration of the six stages allows the generation of themes that are representative of all the relevant information contained in the data (Braun et. al., 2019). Also, the use of software like NVivo which are specially designed for qualitative data analysis (McNiff, 2016), facilitates this process for which it was used in this study to streamline the process.

Finally, the understanding of relevant themes contained in the data through the review of interviews-codes relationship the objective of the analysis was reached (Martinez, et. al., 2021), by identifying the different strategies that according to the expertise and experience of the construction professionals of the Dominican Republic, are necessary for a future implementation of BD in the country's industry.

4. STRATEGIES FOR IMPLEMENTING BIG DATA IN CONSTRUCTION

In this section, the four main strategies identified in this study will be presented. the identification of these strategies for the implementation of BD in the construction industry of the Dominican Republic will serve as a guide or action plan for professionals who understand the impact this could have in their projects and those who wish to implement the technology in the future.

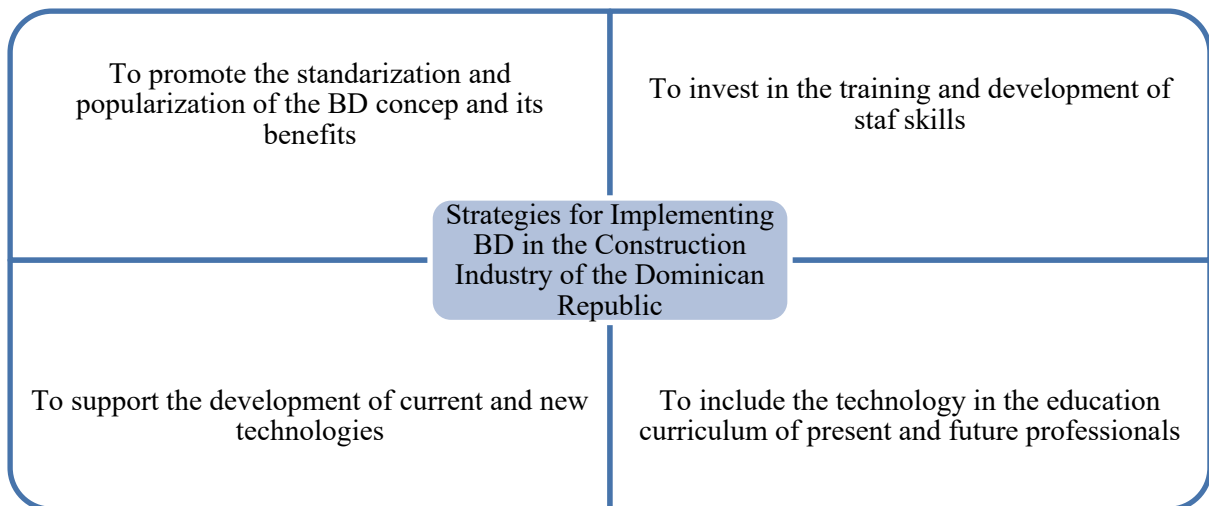


Figure 4: Key Strategies Identified in the Data Analysis

In this case, all the strategies identified by the participants were from the point of view of the organization and the industry, thus generating the first major difference with the literature review where the governmental approach was identified.

4.1.To promote the standardization and popularization of the concept and technology benefits

All throughout the development of this research, including previous studies, the importance of an in-depth knowledge of the BD concept and its benefits has been highlighted, this is based on the low level of understanding that the industry has about the technology in presented in Reyes-Veras et. al., 2021a, as well as the identification of "Lack of awareness" as a key challenge in Reyes-Veras et. al., 2021b. Subsequently, it is consistent for participants to identify the popularization and standardization of the concept of BD and its benefits as a key strategy for the adoption of the technology in the industry. In this regard, interviewee I7 expressed the following:

“[...] dissemination of concept and at the same time, benefits of its implementation”.

The need for a consolidated concept in the industry is a key element for adoption (Reyes-Veras et al., 202^a), as the knowledge of the benefits helps more companies risk investing in the technology. Furthermore, Participant I13 also expressed:

“To implement BD, I believe that the main strategy would be to standardize the concepts and to make sure that everyone knows of the benefits of its implementation, to provide proof of the positive results of its applications and to emphasize which areas of the project process would benefit with its adoption”.

Coinciding with the previous comments, interviewee I18 expressed the following:

“[...] that people get to know the concept and its benefit better, a strategy could be popularising the term [...]”.

With the above statements, the participants expressed that one way to counteract the basic levels of knowledge that the industry has about BD is through the standardization and popularization of the term. This strategy will allow, above all, to understand the benefits of the adoption of the technology as well as the impact that it could have on construction projects.

4.2.To invest in the Training and Development of Staff Skills

Another key challenge facing the adoption of new technologies is the lack of technological expertise (Reyes-Veras et. al., 2021^b), which is especially true for emerging technologies, as professionals are in the early stages of the learning curve (Chehri et al., 2021). For the adoption of some technologies, companies must decide between bringing personnel from other areas and training them in the area of interest i.e., management of construction projects, or train company personnel in the use of the new tool.

The adoption of new initiatives in a company requires many cases to invest in staff training, such is the case of BD implementation, participants identified this strategy based on their experience with previous technology implementation and as a main step they believe will be necessary for a future adoption of the technology, as can be seen in what was expressed by interviewee I17, who stated the following:

“[...] we don't have any strategy other than personal training; we have workshops to learn new techniques and we get encouraged by the company to continue our education with workshops, courses, MBAs, etcetera.”

Interviewee I20, also agreed by expressing the following:

“[...] the ongoing capacitation of workers and management personal”. I20

In both cases, the participants identified staff training as a recurring process in their companies, and which can be adapted according to the present and future needs of the business, thus confirming the effectiveness of the strategy and the development of staff skills as a key element in the adoption in the advancement of the company.

4.3.To support the development of current and new technologies

There are many technologies that could serve as a stepping point for a future adoption of BD, in the case of the Dominican Republic, technologies such as BIM (Silverio Rodriguez, 2020) and the adoption of Smart Devices and drones (Silverio Fernandez, 2019 and Reynoso Vanderhorst et. al., 2019) in the construction industry serve this purpose through the generation and transmission of data as well as the general digitization of processes that is achieved with the implementation of BIM. Therefore, the investment in the development of current technologies is closely related to the development of emerging technologies, as expressed by the interviewee I2.

“[...] the implementation of the Drones and to advance more in the technology part for topography (Land Surveying), because is something that we manage daily, and for example, we have projects that they require it, they require that we become more technological, more developed in that area, for instance bridges, eh, roads, everything that is infrastructure [...] to develop that part in the technology in the topography area, those three are like the main axis [Project Management, BIM and Implementation of Drones] right now of [this company] five years from now”. I2

The recognition that BD currently receives makes companies include investment in the development of areas that allow the adoption of technology in the short or long term within their future development strategies, with what I11 agrees by expressing the following:

“[...] to invest in tools that can use that storage data so we can create a process that will upgrade our decision-making process based on the previous experience”. I11

The investment in tools that companies can take advantage of today as well as serve as a basis for the adoption of future technologies is an attractive strategy that companies could be motivated to implement, since they would not only be investing to receive benefits to future but, that at present they would be incorporating tools that can be applied to current projects.

4.4.To include the technology in the education curriculum of present future construction professionals

As well as the investment in the development of the skills of professionals in the area (4.2), the education of future professionals also plays an important role in the implementation of new technologies (XXX). This is because future professionals would be familiar with the technology to be implemented. An example of this is expressed by interviewee I18 in the following statement:

“[...] start teaching about it in the last modules of university, that way the people that will start their work carrier already know about this and have a better understanding that, that they can contribute to their workplaces”. I18

The inclusion of BD within the educational curriculum of future construction professionals would result in a positive impact for a future adoption of the same, since these professionals would possess the basic knowledge required about the concept and the benefits, which would translate into less resistance. at the time of implementation.

5. DISCUSSION

The need to manage today’s sustainable development needs as well as in the role of construction in the achievement of the goals that have been set plays an important role in the modernization of the industry and the search for tools that allow managing and meeting these expectations. On the other hand, many sources highlight the ability of BD to generate change in the industry that allows meeting these needs, based on the positive results of its BD in other disciplines (Tamiminia et al., 2020; Caesarius and Hohenthal, 2018; Pigni et al., 2016; The Economist, 2012; Raguseo, 2017), whereas limited sources exist about the factors that enable the BD adoption within the construction industry indicating the presence of a gap.

The identification of strategies that allow the adoption of new technologies such as BD in the construction industry allows both the industry and the companies to develop an action plan whose objective is to adopt technology as part of the project delivery process Wattanajantra (2020). In comparison with the strategies identified in the literature (Hwang et. al., 2021), the strategies identified by this study adhere more to the basic effects of technology implementation such as knowledge of it and investment except for the approach to the development of staff skills, which is found in both areas.

In the first place, the need for in-depth knowledge of BD technology as well as a homogeneous concept has been repeated in the different areas of this research (Reyes-Veras et. al., 2021^a and Reyes-Veras et. al., 2021^b), as well as in literature. As an acknowledgment of this and based on their experience, the participants of this study have expressed the need for a strategy that addresses this demand. The promotion and standardization of the BD concept and its benefits seeks to improve the general knowledge of the industry about BD, thus facing challenges such as lack of awareness and contributing to the decrease of the resistance to change identified previously (Reyes-Veras et. al., 2021^b) since familiarization with the concept reduces the chances of its rejection.

Likewise, staff training was identified as a recurrent element within some participants companies (4.2), which is reflected in the choice of staff training as a strategy that would benefit the implementation of BD in the industry, in any case, the development of staff skills is an element considered in most cases within the investment of new technologies, but in this particular case, the impact of providing early BD training for the construction professionals would benefit not only the future adoption of the technology but also the overall digitalization and efficiency of the company processes, and since some cases construction companies already offer ongoing training to its workers it would be a matter only to focus on the development of skills relevant to BD.

This strategy is also supported by the literature, were Hwang et. al. (2021), identifies it as a key element both from the governmental and the organizations point of view, confirming that the implementation of this strategy could represent the difference between a successful adoption of BD in the construction industry and a failed attempt of improving processes and decision-making.

Moreover, another key strategy identified by participants is the development of current technologies that will enable the adoption of BD in the future (4.3). initiatives that companies are currently applying such as BIM, Smart Devices and Drone implementation (Silverio Rodriguez et. al., 2020; Silverio Fernandez et. al., 2019 and Reynoso Vanderhost et. al., 2019), will serve as the basis for the future adoption of BD, both in the adaptation of the data generation and transmission systems necessary for the technology to be implemented and in the familiarization of companies with the digital environment.

Finally, the strategy of including the key elements of technology within the curriculum of future professionals in the industry ensures that they are familiar with it at the time of starting their working life thus minimizing any resistance they may present to the adoption of Big Data in the future (4.4). The low level of knowledge that the industry has about the concept of Big Data and its benefits represents one of the greatest challenges for implementation.

In summary, the key strategies presented above reflect the current state of BD technology in the construction industry of the Dominican Republic. And therefore, they focus on the basic elements such as improving awareness, promoting investment in tools that benefit both the current projects of companies and the future adoption of technology, developing the capacities of the person to adopt this and other technologies, as well as the expansion of the concept towards the area of education in charge of training future professionals in the industry.

6. CONCLUSION

Change is inevitable and the challenges faced by the construction industry become more difficult due to the low productivity and efficiency that have characterized the industry in recent years. The possible solution that Big Data offers to these problems as well as the improvement of construction processes in general is what makes this technology to be identified by various sources as the future of the industry. The attachment of the construction industry to its traditional practices makes difficult the leap to digitization needed both to overcome these challenges and to meet the requirements of an evolving society.

The demonstrated ability of improving decision-making and efficiency are some of the aspects that make BD a key tool for the future of the industry, so the exploration of the elements such as strategies that reveal a path to a successful adoption plays a key role in the implementation of the technology, thus improving the odds of being successful as well as speeding the implementation process.

The identification of BD adoption strategies will help construction companies to plan their implementation process by taking actions today that can smooth the process once they are ready for the technology. This study highlights the need for the industry to join in the efforts to standardize and popularize the concept of BD in order to overcome the challenges faced by the industry. in-depth knowledge of this technology and its characteristics will ensure that it is adopted at all levels of organizations as well as industry thus reducing the intrinsic resistance to change of the construction, also, the popularization of technology ensures affordability. Moreover, the investment in technologies that companies can take advantage of in their current projects as well as serve as a basis for the implementation of BD as well as the development of workers' skills, it will ensure that when implementing the technology, companies have the necessary tools. Finally, the strategy of including BD related content in the education stage of future professionals will create familiarity between the professionals and the technology which reduces resistance to change and makes adoption smoother.

This study is limited to the identification of strategies for the implementation of new technologies such as Big Data. The impact of this strategies exists within the framework of the construction industry of the Dominican Republic, but with the prospect that they may be useful for the overall adoption of technology.

Ultimately, this study and the wider research to which it belongs, will serve as a contribution to the body of knowledge of BD technology aimed at researchers, professionals, and students alike. The specific case of these strategies will serve so that both the industry and construction companies can create an adequate action plan that paves the way for future adoption of technology.

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