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Artificial Intelligence and its aids to the Construction Industry

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Abstract: **The article focused on the usage of Artificial Intelligence and its aids to the Construction Industry. This paper examines a few case studies and elaborates on some of the benefits of adopting artificial intelligence in the construction industry such us streamlining the stock chain, provides a safe and secure environment for human beings and etc.it is clearly noted that artificial intelligence has contributed positively in saving cost and time in the construction businesses**

Keywords: **Artificial Intelligence (AI), Construction and Engineering Industry, Construction Projects.**

1. INTRODUCTION

20^{th} century came to an end with a historical development known as 'industrial revolution' which was then led on by 21^{st} centuries fascinating innovations in technological realm. Indicating a reformation in modes of operations and shifting the demand and supply from merely simple and small-scale products to world's most immense infrastructure build-up. Modern day world and its inescapable reliance on engineering and construction sector to create and develop at a faster rate which is amplified over a past few years due to developing technology and increasing globalization. Competitions are increasing at superfluous speed creating and formulating new horizons for the production of industrial materials in construction projects.

Globalization has led to the formulation of relations that are devoid of boundaries and borders and one of the most significant roles in this regard is played by digital technology. The unceasing progress of virtual capacities have the world and its functions an inevitable part of it. Normal functioning has shifted massively to the computers and digital technology. Amidst these inventions one of the most crucial determinant is 'artificial intelligence' or AI which has altered the ordinary standards of operation. Global trends have hinted a major decline in construction business and production trends. Reasonings behind the decreasing trends are deemed to be the high cost investment which requires a deep root analysis in order to understand completely. However, the idea that the emergence of digitalized productions in construction businesses have led to the formation of another lens through which the betterment and positive growth could be determined.

2. LITERATURE REVIEW

This article tends to examine a few case studies in this regards that will provide sufficient grounds for the argument to be knitting the idea of artificial intelligence and its aids to the construction companies. Ar. Gayatri Mahajan (2019) has studied the core reasons that make artificial intelligence inevitable to growth. She regards the use of artificial intelligence as a strong reason behind the growth of construction and engineering industry mostly due to its immense potential of improving that fields efficiency and performance (Mahajan, 2019). Artificial intelligence has developed the skills over time that manages the system more brilliantly. Millions work with AI-powered applications in daily life and they even don't observe that. And what is more important, skilled marketers don't create artificial intelligence as the central feature of a product, as it can confuse users from the first impression (team, 2020). These efficiencies are growing at rapid pace because they offer a wide range of applicable and appropriate management techniques. AI is also helpful in realistic situations for training, costly mistakes, efficient operations and injury reduction (Mahajan, 2019). Human skills are being employed for more useful

purpose such as the proper learning of methods to deploy and use such technology than being harmed by physical labor. Artificial intelligence is also performing promisingly to alter the business models within construction industry such as logistics, customer-relationship management, finance and support (Monroe, 2018). AI is being used in construction companies to monitor job-site requirements and development and spot risky behavior, for instance (Artificial Intelligence is reinventing construction scheduling, 2019). The digital technology has led to a redefined relationship between consumer and provider, between demand and supply which more far reaching and reliable. This helps the consumer get in direct contact with the supplier or service provider and creates a sense of trust which is the core factor of developing a strong market. By utilizing AI in association with big analytical information, you can create reports for earlier projects, pinpoint where the overruns were, and foretell better estimates for future ones. You can also use AI to streamline your stock chain and avoid expensive setbacks with the same method (Benefits and Impacts of Artificial Intelligence in Construction Industry, 2020). AI applications can discover from data and consequences in real-time, examining fresh knowledge from various references and conforming respectively, with a level of efficiency that's precious to a business (Artificial Intelligence, n.d.). The AI can gather from there what might appear if a license has dallied or a disturbance or an incident happens and run through various situations suddenly (Walch, 2020). Machine learning and job site facilities are improved by the usage of AI and making the sites more reliable and safer for the workers and resulting in expense savings for the construction company. As AI collects information from drones, job site cameras, or spot robots it may immediately recognize and flag dangerous sections red (All in Construction: How Construction Projects Benefits, 2020). Such technological innovations have made multitasking a very easy process. In tech or financial services, AI is most successful, the absolute system of the construction companies indicates they have a way to trove data (O'Malley, 2020). Financial expenses of these firms are extensively reduced because the human labor is shifted to AI which is somehow more reliable and reduces the chances of making error by suggesting the most appropriate solutions based on facts and accurate predictions. AI also supports workers remotely to reach real-life practice material which encourages them to improve knowledge and develop their skills quickly (Rao, 2019). The most advanced purpose for AI in architecture is more effective and a safe site for human workers and their lives are made more comfortable and construction companies can estimate and reach the requirements of their activity force more effectively (Biggs, 2020). The human lives that were usually at risk during the hazardous projects in the most difficult areas of the world are made safer and more dependable.

Harvard Business Review claims that 60% of respondents to their survey stated that the reliance of their company's future and success is dependent on proper implementation of artificial intelligence and almost 36% of other organizations were beginning to incorporate machinery in their functions (Monroe, 2018). Construction industry is definitely growing with the increasing infrastructure and globalization. There are factors that deeply influence the construction projects which include complexity and uncertainty of activities therefore an efficient tool to analyze the delaying factors which could be the key to estimate an accurate duration of these construction projects (Zaher Mundher Yaseen, 2020). Artificial Intelligence is widely used in field of science and technology (Zaher Mundher Yaseen, 2020).

Activities that hinder construction can bring in the use of AI to make developments in scheduling, safety, quality and productivity (Mahajan, 2019) which clearly demonstrates the idea that production is increased and quality is maintained throughout the process. Mahajan (2019) is also the mentioned the details of how an entirely new ecosystem is developed based on the increasing prospects of AI (Mahajan, 2019). From the economic sector to construction, AI devices are being utilized to examine activities in real-time, boost productivity, and cut costs (Hook, 2019). A system based on AI, with a way to a database of various plans of development that have been built before, can develop design options based on the information it obtains from systems in the database (Schober, 2020). AI may further enhance progressively at its job, starting up new promenades for efficiency, potency, protection, and trustworthiness (Lawrence, n.d.).

AI is increasing in the construction industry everywhere as part of a larger shift approaching smart construction technology (Invonto, 2018). AI covers an extensively wide range of technological devices including machines, chat-bots that usually efficient to provide sufficient responses to human queries making it easier for the company authorities to manage the labor expenses and time. Ar. Gayatri Mahajan (2019) also sheds the light on the fact that technology and AI development has helped with the alert issues making the jobs easier by saving their time when they are not present on site (Mahajan, 2019). In essence, it says that AI intervention in this field has led to the development of a safe and secure environment for human beings through which they can easily operate in the rapid moving surroundings. Kranz has also focused on the fact that people need to realize the AI intervention and must prioritize its existence in order make survival easier (Monroe, 2018). However, the reservations have been aroused among the workers that fear for the loss of their jobs because now the company could have a machine instead of them that might deliver more efficiently and productively. Patricia Monroe (2019) has also

illustrated the idea that it needs to accepted as an ease to work not as a competition (Monroe, 2018) because it might only help as another working hand. Gondia et al. (2019) has also used the Naïve Byes and tree decisions model to show how AI could be extremely helpful in reducing risks (Zaher Mundher Yaseen, 2020). AI usage cases in development are still comparatively formless, though a small set of start-ups are obtaining market traction and concentration for their AI-focused approaches (Jose Luis Blanco, 2018). The predictability is increased due to efficient calculations and statistical analysis which is then a useful source in increasing profitability. AI database operations can notify technicians of the most reliable building and construction methodology for a site, based on prior projects as well as pre-existing drafts in the design stage (How Artificial Intelligence is Being used Within the Construction Company, 2019). AI technology is being used by construction companies to obtain well-defined knowledge and penetrations to security and productivity (Articial Intelligence in Construction Market- AI industry report 2027, 2018).

3. METHODOLOGY

Contemporary times have unfolded a great of competition among the masses around the globe. Firms are developing the strategies to provide their best and perform well enough to earn profit and trust of their consumers. Globalization, is an extremely emerging trend that is needed to understood in order to dichotomize the pros and cons of benefits given to the construction industry by intrusion of AI. These globalized patterns of economics are largely a result of the mixed economies and foreign interventions. Modern day capitalist economies have business trend of acquiring and expansion to the countries and parts of the world where labor is cheaper and easily available. Similar, is the case with construction company which could acquire and expand and one of the most important factors that helps in the process is artificial intelligence. People are globally connected due a single virtual world that has digitized almost every aspect of everyday social movement and interaction. These interactions have successfully reached all of the remotes parts of the world making it a lot easier for human beings to interact and fulfil their needs. Artificial Intelligence helps in analysing the market trends by calculating the supply and demand rates, the products with higher demand in the market and the cost at which maximum products are sold off. Organizations are approving AI technological inventions with a perspective to adjusting to or unsettling their environment while emergent and improving their planned and competitive returns (Wamba-Taguimdje, 2020). These successful plans are providing insights into the impacts and influences of the strategic implementations. Hence, the idea that global trends are most important to be navigated in order figure the right strategy.

The data that is collected through these logical setups and predictions which then provide the firms relative grounds to market and enhance their process. Construction, in early ages, relied extensively on human labor but the advent of machines and fascinating mechanical machinery has helped human being to save their health and carry out large and extreme works merely by operating certain machinery. This intervention has made human life a lot easier and has reduced the risks of life losses that used to occur previously. The case studies analyzed throughout were carefully selected to highlight and input every single aspect of the benefits of AI in construction sector because this sector has been one of the most influenced domains due to the intervention of AI.

4. DATA ANALYSIS METHOD

In order to analyze the collected data a major requirement is the critical analysis of it. A critical analysis puts in every sort of risk and benefit, harm and profit, that too not only on the basis of its economic benefits but also on tits environmental affects and impacts. While analyzing a particular data regarding a subject such as the beneficial influence of AI in the construction business and process throughout needs that the data should be collected which highlights the human ease and its contribution to the world in most positive way. This contribution results in a pattern which allows to calculate the intensity of consequences for over a period of time and also limits the unlimited horizons of predictability because the data gathered is not assumed by statistically and evidently proved based on facts.

The fact and evidence with clear demonstration of arguments that justifies the behavior to not being discriminatory towards any of the human beings or the world we live in. Artificial Intelligence is indeed playing a part to the human intelligence which has proved quite beneficial for the work environment but the idea that it should not be committing any harm towards them either. The data analysis also requires the environment and societal impacts of the shifting economy on the people in order to do justice to the actual meaning and purpose of analysis. In order to analyze a data or research, critical approach is extremely important because it makes the loopholes, or not exactly, the additions to the same approach making it more informative. The proper information about the subject is primary requirement to make sure that factual information about the issue is gathered from the most reliable sources amongst all. The most authentic data is already formulated on critical analysis formula which makes it easier and more diverse to form a perspective.

5. DATA COLLECTION

Data collection begins by investing time and attention into the areas where most of the work is actually in process. The scholarly articles that are gathered were checked for their authentication and validations. The data collected in purely based on facts and strong evidence with valid arguments and counter arguments that clearly demonstrate the sold reasoning and appropriate data required for this research to be conducted. There were articles that were based on the interviews of people who are leaders of the construction companies and are responsible for the strategy implementations that lead the company into vast domains of AI and its success. The counter arguments in order to analyze the topic critically, which is extremely essential to bring above a genuine and authentic perspective and a take which is unique or could fill in the gap that is left in the research. However, the research gap requires a very important filling which is authentic and reliable to the core without loopholes. The fact that every material or research that builds upon an idea is open to interpretation because there are multiple perspectives and provide an approach that is complete in itself. The idea is to provide a broader perspective on an issue which requires the incorporation of multiple arguments in order to counter the issue and even recommend a suggestion that is viable enough.

Data collection requires a great deal of literature to be incorporated because the theorizing of the issues and everyday instances that include the technology and AI intrusion in construction projects brings it even more close to the reality-based perceptions and ideas are generated. Theories helps the strategic implementation that is necessary in order to bring innovations that are economical. Moreover, theorized ideas have a hint human perspective and the experience is situated in a very deep analysis of human perception. The success of a technology could only be measured by the fact that its influence and impact on society is optimistic in nature. Exploitations that are an essential trend of the modern-day world businesses should be least and attempts that are necessary to secure and guarantee the rights of labors could only be brought into the limelight by theories. Hence, the theories are extremely important to be incorporated during data collection process to bring in a more humanitarian concept.

6. DATA ANALYSIS AND DISCUSSION

The aim of every research is to present a critical view on a subject or an issue which is directly related to the human world and environment. Human subjectivity makes it hard to detach from any activities that is happening in the surroundings which is the then the topic of analysis. In relation to the context of human existence the artificial intelligence has a very enormous part in redefining their roles which is directly and directly altering the ways of power structure operations. Hierarchal structures are being changed because the jobs that were once a part of human duties are now largely being carried out by computers and smartphones around. Virtual world has provided a space for human beings to interact with a more effective manner that makes it a lot easier for them to catch and grab the attention of the entire globe to certain issue. With this ever-increasing interconnectedness and communication, the performance goals are also toughened because the demands and expectations for the best quality is enhanced.

Environment and climate change are one of the most alarming issue in the modern-day times when the world is now actually on the verge of announcing a climate emergency. These circumstances have laid upon every single person a moral responsibility to protect the environment that has given it a lot. The future of upcoming generations is at risk due to water shortages, increased level of heat and cold, ozone depletion etc. which has made it impossible to ignore the horrible consequences of this deterioration. Artificial intelligence is indeed a very favourable technology and its use could be brought into the plans and techniques that could reduce the wastage, save environment and nature. There are ways and techniques to play a part in improving the climate conditions. The part of construction business and its use of artificial intelligence must be insightful and thoughtful of the harms it can cause to the environment because there are many tree cutting projects to build buildings which could be replanned or engineering techniques could be applied to preserve the nature.

There is no second opinion to the fact that the world is immense need of a technology that save times, produces more. The rapidly changing habits of society have made the technology an extremely important part of their lives. It will not be wrong to say that people mostly now operate on their mobile phones. Situating this busy world in the virtual and extremely fast world that has blurred the boundaries of physical and digital domains, has made it impossible to imagine a world that operates without technology. It is computers that provides humans the assistance that is needed to carry out their works properly and on time otherwise it would be impossible for them to fulfil the tasks. The time saving predictions are extremely helpful especially when they predict the risks. Risks such as to the lives of human beings because they are the most precious asset. These risks could only be calculated through the machinery that is specifically designed for the purpose of telling the

factors that could be risky during the process of construction, such as the quality of cement or the accuracy of straight standing building which has the risk of falling in case of an earth quake. Such important jobs and functions that are impossible to be done by simple human beings are done by these artificial intelligence machineries rather easily.

The time saving aspect is also largely reliant on the predictability aspect of AI computers that are efficient enough to suggest rapid and viable solutions to the team for long-lasting effects and better performance. They are super helpful in making the company a name that is trusted by people for it quality and safety. There are projects that are planned to be completed over a period of years which is planned even before that. The influence of weather and climate conditions is also a very important factor in determining the time span for completion and target achievement. Target achievement and timely target achievement is a competition that defines and decides the competitiveness of any firm. The business firms around the globe have conquered a position and power due to their durability and efficient services.

7. CONCLUSIONS AND RECOMMENDATIONS

In conclusion, it is clear that artificial intelligence has made its part in developing the construction business a lot in terms of cost and time. For the matter of heavy investments that idea was that the labor could be reduced and replaced with more efficient computers that are fast working and help in the better working of the company suggesting best and low-cost ways to carry business. The acquisition strategy is also helpful because it helps in developing relation across the borders with almost zero or very low cost because the only cost consuming part is the webpage of platform that connects the world. This strategy has led to formulation of world-wide contracts that have also opened the doors of economic development in many economically instable areas because foreign investment brings along millions of opportunities of jobs and skill development.

Moreover, the construction sites used to employee a lot of laborers for extremely hard-working purposes such as stone-breaking etc. in the areas that were not weather friendly for humans. The development of AI has made the jobs easier for them and has it possible for the laborers to work in mare friendly and healthy environment. The AI has replaced much of the human labor and has provided a service that has reduced their energy consumption but the fact that this replacement should not be discriminatory or exploitative towards the previous labor. The ease of the owners of the firms should not be able to monopolize and capitalize over the economic right of the human labors. The construction projects that are initiated in remote parts of the world must assure the economic opportunities to the people residing in those areas because they are dependent on their own resources but when such firms intervene and start a market to gather the resources, they must assure the deserving share of economic benefit of the people. Job opportunities must also be initiated and the skill developmental projects should also be brought along.

The recommendations for this plan and development is that the discriminations should be kept in mind and human along with their environment. The capitalist systems have inherent modes of exploitations which are usually and easily overlooked but the fact that they require attention should be paid attention. The laborers that serve the firm should be given their due right and share and their safety must be ensured. The must be provided with the security and assured that they will be protected legally and socially. Their pensions must be guaranteed along with their jobs. The insecurities that are increasing due to the increasing interventions and use of technology and artificial intelligence must be addressed. The human form of labor cannot be replaced because they work with empathy and devotion which is needed to be paid back.

The environmental hazards must be kept in mind should always be prioritized because no business or project that is causing harms to human society is justifiable in any sense. Environmental safety is the only way to sustain resources that are necessary to develop the businesses and functioning of the everyday operations. This continuous operational mode of society which has led to the enormous developments in almost every field that has made the computer and technology an inescapable part of this reality. This perception of reality has created many distortions in the image of surroundings as well but if considered and analyzed properly, they could contribute towards the betterment within this society. The hardcore technology should be human and eco-friendly in order to promote the appropriate thinking skills in people. A proper critical analysis is the only solution to deal with the risks, fears and harms that are brought along every project that takes part in society and alters the normal human functioning. This functioning must be restricted and should not be allowed to monopolize over the human beings that are devoted and passionate workers. The main aim and target should be to serve the society and return them the quality for which they have trusted them. The relationship should be reciprocating and empathetic never oppressive or discriminatory in order to create an example in the society that perpetuates good and just

morals and even persuades the team workers to behave the same way towards each other. Social impacts, hence are the key to analyze any new technology and its worth because without the proper influence and that too, in the right direction everything is oppressive and does injustice with the people who trust the authorities with their rights to be fulfilled and preserved. Society should prioritize humans over material world and the prevailing perception should of kind that allows people to exercise their rights with a guarantee of economic safety and legal security. This combined world that we live in has granted us the duties of protecting and preventing the economic and social rights, and technology should not be allowed to breach the rules and moral codes of conduct.

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