Current Challenges facing Civil Engineering and Construction

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Abstract:

Engineering is a field which seeks to find tangible solutions to a wide range of issues. Civil engineering deals with the planning, design, development, construction and maintenance of structures and infrastructures as well as roads, railways, airports, bridges, dams, irrigation projects, power plants, and water and sewerage systems. There are many issues must be aware of today which affect these structures. Civil engineering sciences is concerned with studying these issues and finding solutions to them in terms of construction and maintenance. Civil engineers have a great responsibility to build and maintain structures and make life easier. This article offers some solutions and thoughts for some of the most pressing issues which are occurring in the world of construction and civil engineering.

Keywords: Civil engineering; Infrastructure; Sustainable; Corona virus; Carbon footprints.

Introduction

There is a great demand for civil and structural engineering due to its crucial role in modern society. That puts more pressure on civil engineers today to be aware of the challenges facing the profession in order to prosper and survive. It is important for civil engineers to think about the current issues that dominate the field in the hope that they will be addressed immediately. A modern cities must meet the standards of the 21st century. Cities differ in term of history, culture, political context and geography and they face many issues such as migration, an increase in the population, the flow of goods and economic crisis. It is difficult to follow the changes and focus on building a modern cities, however, reducing congestion and properly planning the flow of traffic is one of the most important stages of economic growth.

Urban populations growth:

The population of cities is increasing rapidly, and the average rate of population growth in cities was 10.53 times in 2010 than it was in 1950 [1]. The invention of self-driving cars and delivery trucks is one of the most important issue should be taken in consideration. The vehicles can be in use 24/7 which means no limit on the number of hours worked and a more efficient use of infrastructure [2]. At this advanced stage, additional safety structures should be required in order to the safety of the traveler and to change traffic control protocols.

Climate change and pollution:

For a long time, the issue of climate change and flood management has been a huge problem for several reasons. Increasing ocean temperatures with melt water from land-based ice is causing sea level rise which is expected to rise between 0.18 and 0.59 meters by 2100. On the other hand, other parts of the world are exposed to drought due to lack of rain water and high temperature [3]. Under the influence of these changing climatic factors, structures are affected by these conditions and also reducing the durability and service lifetime of constructions. All these and other factors that directly affect structures must be taken into account when choosing materials for construction. Many places around the world have been affected by climate change, for example, a third of Africans already live in drought areas and 220 million are exposed to drought each year [4]. Work sites, construction projects, and even modern cities should be far from places of unaccustomed environmental conditions. Important points such as the enhancement of disaster management and improving flood management should be taken in consideration. Polar ice caps and glaciers are over 68% of fresh water and thus largely unavailable for community use, about1.2% is found in streams and lakes and approximately 30% of global fresh water is groundwater [5]. In different countries around the world such as African and Asian countries which the proper management of groundwater is a major challenge thus the increasing in the use of groundwater has actually become a threat to the planet and people. Currently, about 24% of global groundwater are highly overexploited and the main driving factor is irrigated agriculture to feed people and livestock [6]. Through sharing advanced practical knowledge that the industrial world can properly manage groundwater in different situations. There is a wide international debate about water quality control, especially with the increase in plastic pollution which can leach into groundwater from dumps. Plastic pollutes water bodies and oceans by rainwater run-off, flow into waterways or discharge directly into coastal waters [7].

Health and Safety:

The safety of workers on construction sites includes the avoidance of dangers and the protection which is possible to cause injuries, fatal accidents or in the current time infection with disease such as Corona virus. The civil engineering work sector is exposed to multiple dangers on a daily risks which is one of the most important sectors of work such as electrical, demolition, plumbing, joinery, plastering, glazing and g painting. The fatal injury rate (1.74 per 100,000 workers) is nearly four times the industrial rate, although the worker fatal injury rate has shown a downward trend since 1981 but has generally remained stable in recent years.

The latest estimates between 2017 and 2020 show that in the construction sector there were 61,000 non-fatal work injuries resulting and 27% being absent for more than seven days [8]. Construction engineering workers have faced dangers under normal conditions during their work such as manual handling of heavy loads, falls on same level, harsh weather conditions, falls from a height, heavy noise, dust emission, struck by moving object, electrocution, various type of injuries and recently Corona virus exposure. Appropriate personal protection equipment should be used by civil engineering workers, moreover, Use hand sanitizer, social distancing, rest times and clean the tools before and after using. The importance of education and good practices are key to maintaining them from management to workers level. When employees understand the rules of work, they are raising the level of their performance, productivity and safety significantly. Each country has its own specificity in construction which is different from one country to another, thus, The rapid rate of deterioration of infrastructure varies which requires more attention and financial investment.

Pandemics:

Every country in the world is almost affected by the Corona virus. Its spread has left economies and companies suffering greatly and governments are struggling with new lockdown measures to resist the spread of the virus. The collapse of small business companies due to the global recession and the impact of the pandemics. Many people around the world have lost their jobs or seen their incomes decline and unemployment rates have risen in major economies. The numbers of new job opportunities in many countries are still very low, as well as millions of workers have been placed in government-supported job retention programs. Recently, self-employed and freelancer were affected by the ban caused by the spread of Corona virus. During this turbulent time, finding work in the civil engineering and construction industry has been one of the most challenging issues. Corona virus has changed the pattern of work or in other words it is accelerating the changes that were slowly occurring before Covid. There is no longer any doubt in the minds of employers that working remotely is not only possible but comes with a lot of benefits. However, people management wonders if wages could go down if companies moved away from office work. Trying to find work in local companies that would save you a lot of effort, time and work bureaucracy. Companies with 5 to 15 local employees don't have huge departments that applications can get lost in, however, they have competitive pay rates [9]. International companies are highly sought after and have great competition terms but they have long-term contracts. However, some advice would be that do not give up the reason that humanity will always need employees and workers.

Carbon emissions:

Many countries around the world are now focusing on sustainable solutions in an effort to reverse our carbon footprint and civil engineers have a significant contribution to make in portraying this effort. At the beginning of 1950 the world emitted 6 billion tons of CO2 and emissions have continued to grow rapidly until 2019 which emitted over 36 billion tons each year, the emissions were very low Before the Industrial Revolution [10]. For reducing carbon footprints a fully integrated Life Cycle Assessment (LCA) should be taken as approach to all design decisions by designers. This approach considers all other aspects of the project's performance such as material, water and energy needs across the entire project steps to reducing carbon emissions.

The above mentioned issues are challenges that require a methodical approach. It is important to focus on each issue until everyone agrees that the problem is clearly and correctly defined. Effective and correct solutions must be found to solve all problems from the ground up. Part of this approach is to think positively and creatively about the situation. When looking at the problem positively, the more confident and optimistic you will be when approaching any complication because problems are a fact of life. Obstacles should be viewed from every angle before you start offering solutions and geniuses are solving problems with out-of-the-box thinking. Take responsibility for decisions ensuring that everyone involved knows what work they need to do, when they have to do it and how a solution is successful or unsuccessful. Once effective solutions are found, answers need to be examined by using new reliable simulation technologies. The obstacles can only be overcome by using all our resources and knowledge.

Conclusion:

This article focuses on the problems which facing the construction and civil engineering now and likely to be continuous for the coming years. It may not be possible to cover all aspects of this issue, but it is worth considering the use of sustainable materials, the modernization of traditional building methods and the use of renewable energies in construction. The world is exposed to a huge and quick changes. We are currently facing challenges such as climate change, civil unrest, increasing population levels and last but not least a the different strain of Corona virus. Extreme weather events and sea level rise are damaging infrastructure around the world. Infrastructure failure such as power outages, roads and bridges damaging that have occurred during these extreme events. For example, a failure of the electrical grid could affect everything from water treatment to public health. There is an urgent need to create and maintain more infrastructure which exposed to extreme climatic conditions. There is a huge challenge and duty that the civil engineering community must overcome by appropriate means.

Moreover, long-term issues of sustainability and development are also receiving more attention. Improvements in working conditions and work organization can lead to increased productivity and competitiveness. Civil engineering sector can make life better and enhance services and international security. And after all this, civil engineers are catalysts in the modern world.

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Conflict of Interest:

No conflict of interest.

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