# 2. Literature Review

## 2.1. Digital Technologies

Digital Technology which generally refers to the devices, tools or other computer driven widgets which could help performing many activities lightly. There is a various application of digital technologies out there nowadays like GPS, Smart Homes, Artificial intelligence, etc. Use of this technology have been widely appreciated in many projects, on which a number of studies have been undergone like the Exploration of Digital Technology Adoption of Construction Projects in South Africa (Ikuabe, 2020), The role of it in promoting smart city governance (Viale Pereira, 2018) and many others.

## 2.2. Adoption of Digital Technology at Construction Projects

### 2.2.1. Construction Industry

The type of industries which mainly deals with the part of establishing, repairing and maintaining sort of things, is called as the Construction Industry. It is considered to be a matter that should go on some changes due to its repeating problems like lack of certainty, poor productivity as compared to others, unfulfilled product satisfaction and out of date processes (Kamara, 2000). One of the factors of the many challenges arriving at construction industries is the product of using new technologies and tools in inappropriate ways. As of studies of Sutton, there are a lot benefits of digital transformations in Industries as it saves approximately $1.7 billion yearly (Sutton, 2018). Other trends include the application of Robotics and Automation in construction processes. Ruggiero tries to convey that use of robotics in construction helps giving more accurate and high-quality products (Ruggiero, 2016). Also, the Inclusion of Drones application in Construction Industries was studied widely. Kardasz, Doskocz and others studied about the drone implications, defining drones as an aircraft which needs no pilot or passengers, which can have any preferred size (Kardasz, 2016). This initiative was found very efficient as according to (PwC, 2018) , the construction industries using the drone method, were found to be have reduced the life-threatening accidents by 91% which is quite a big number for affirmation. So, that’s how the studies proved that how much they’re important in industrial projects using technologies like BIM, IoT, etc.

### 2.2.2. Digital Technology at Construction Phases

The use of digital technologies is not only limited to an instance or period of time, but it has been looked up to different phases or life-cycles of the working of industries, which can be ordered as Designing, Construction, Operation and Maintenance phase (Aghimien D., 2018). Now during the Design Phase, where sort of material, type of platform, product expected are selected and identified, BIM and Computer Aided Design Software are considered the best as it paces up the process in less cost, more reliability and with much lesser faults (Eastman, 2011) . The Construction Phase was also supported by Drones, which helped a lot for surveying the process much easily. Castagnino suggested the use of technologies like sensors in the operation phase, which was found beneficial in smooth maintenance and database manipulation (Castagnino, 2016). The encouragement of Digital Technology during Maintenance phases was found to be more health supporting and safer than ever.

## 2.3. Role of Digital Technologies in Smart City Governance

### 2.3.1. Smart City Governance

Smart City is identified mainly through the enhanced quality of city life by the use of advanced technologies. One of the main technologies used for a smart city governance is ICT (Information and Communication Technology) which helps bringing a communicative platform that eases the engagement, interaction with public and efficient decision making. Also, Establishment of Social Medias gets more informative for the citizens. Talking of Decision-making, Data-driven method is a key element for smart cities. As said by Ruppert, Data-Driven process is one of the best methods for logical and knowledge-based decisions through analysing the statistical data, text and social medias (Ruppert, 2015).

### 2.3.2. SMARTGOV Project

### (Viale Pereira, The role of digital technologies in promoting smart city governance, 2018)

The SmartGov Project mainly provides a big help for running Smart Cities by setting up an efficient Decision Support. There are a much of unutilized data in the forms of social medias, surveys, etc. which can be collected with Fuzzy Cognitive Maps (FCMs) to understand the causes and give an effective solution to any problem aroused. Looking up the evidence reviews, the goals of SmartGov are mainly to develop some user healthy tools for different analysis tasks, to scan and apply the tools in cities in Cyprus and Spain having low-carbon energy, transport systems and sustainable tourisms and to observe the outcomes. Thus, we have seen that the use of the Digital Technologies has a helped a lot in the SmartGov Project.

## 2.4. Effect of Digital Technology in an E-Learning Environment

### 2.4.1. Digital Technology Integration in Academics

The coming of Digital Technologies in Teaching Institutions has gradually replaced the old system and have a big effect on student’s academic performances. It has for sure facilitated teachers in some ways as they have many digital tools to use now in the classrooms (Brengarth, 2016). Henderson studied about the experiences of university students towards digital technology use in studying or learning, where they surveyed 1658 undergraduate students, the result of which led to 11 useful positive effects of Digital Technology like easy task management, time saving, ease at availability of study materials and more. Hence, Overall effect of Digital Technology Integration in contributing to student’s academics is positive and helpful.

### 2.4.2. Project-Based Learning (PBL)

The Project Based Learning Method is one of the key factors included in smart classes. It is defined as learning that is more focused on project building through the help of investigations and help in finding solutions by debating and analysing ideas with a proper communication with each other (] Choi, 2019). This programme mainly aims at increasing student’s enthusiasm in studies through these engaging factors. Gomez-Pablos in his investigation for PBL, collected data from 310 teachers about their opinion on this initiative and found that project implementation increased student’s participation (95%), motivated them to learn (96%) and also helped them to learn various curricular skills alongside (Gómez-Pablos, 2017). Now, when we talk about the relation between PBL and Digital Technology Integration in Academics, we can see how reliable the technology could be for PBL making it more cool and interested.

### 2.4.3. Technology Acceptance Model

There are a various programs based on digital technology in the teaching sections of which Technology Acceptance Model (TAM) is considered to be one of the best. This model was used to explore the technology surrounding in terms of perceived usefulness and in the direction of integration of digital technology with academic performances under PBL. The observed outcomes about the relation among Digital Technology, PE and PEU says that these have improved academic performances of undergraduates. These outcomes are supported by the TAM literature (Davis, 1989)

## 2.5. Conclusion

With the help of all these examples of Digital Technology in Industrial use, Smart City Governance and in E-Learning programs, it can be concluded that Digital Technology overall is real gem to the society in making things easier and cool. Though, it can have some negative consequences too, but looking at the bigger picture, I would always choose encouragement of use of Digital Technologies in any sector od Project if can be.