# Chapter 3
# A Review on BIM and Information Technologies Research in the Construction Industry

**Omur Tezcan**
*Istanbul University, Turkey*

**Cemil Akcay**
*Istanbul University, Turkey*

**Begum Gazioglu**
*Istanbul University, Turkey*

## ABSTRACT

*The construction sector is in a development due to technological innovations in recent years. The innovations in information technologies change sectors very fast like telecommunication, health, and automotive, but this process is slower in the construction industry. In this study, the development of the researches in the construction sector has been examined within the framework of technological innovations. Some of the most important publications in construction information technologies, Automation in Construction and Advanced Engineering Informatics journals, have been analyzed. Publications covering the years between 2012 and 2018 related to building information modeling (BIM) and other developing areas were reviewed. The interaction between BIM and the other technological trends such as AI, machine learning, internet of things, deep learning, and 3D printing has been explored.*

DOI: 10.4018/978-1-6684-7548-5.ch003

## 1. INTRODUCTION

In recent years, as a result of digitalization and technological developments, there has been a great change in every sector. While these innovations change other sectors very fast, construction sector has been slow to adopt process and technology innovations. According to a report published by McKinsey and Company (Agarwal et al., 2016), construction industry is among the least digitized sectors. According to the same report Research and Development spending in construction runs well behind that of other industries: less than 1 percent of revenues, versus 3.5 to 4.5 percent for the auto and aerospace sectors. Also, for spending on information technology, which accounts for less than 1 percent of revenues for construction (Blanco et al., 2017). Technical challenges specific to the construction sector have a role in the slow pace of digitization. Main reasons for this situation are the specificity of each project, difficulties in finding skilled workers and collecting proper data.

Building Information Modeling is one of the biggest contributor to digitalization in the construction sector. BIM is used mostly in all phases of construction projects from design phase to maintenance and operation phase. Also, technological trends such as AI, Machine Learning, Internet of Things, Deep Learning and 3D Printing are changing every sector. We see many products in current life on the impact of these developing areas in other sectors. Many new applications and products using artificial intelligence in finance, telecom, information technologies and service sector are entering our lives. For example, there are news that autonomous vehicles will enter our lives in the near term and we see experimental vehicles on the roads. What is the situation in the construction industry? When are we going to see robots that's makes construction? How far away are the artificial intelligence applications that make architectural design, calculate construction budget, prepare contracts, prepare the most suitable work program according to the project, give automatic work order, control productivity and work quality. These questions were our source of motivation in our research. Our research covers the period between 2012 and 2018, but the articles we give as examples are mostly published in 2018. Also in this study, the authors analyzed research about Building Information Modeling and its interaction with other trending topics.

## 2. REVIEW ON INFORMATION TECHNOLOGIES RESEARCH IN CONSTRUCTION INDUSTRY

Within the scope of this study, the authors reviewed 1874 articles in "Automation in Construction" and "Advanced Engineering Informatics" journals for a 7-year period between 2012-2018. The reason for choosing "Automation in Construction" and "Advanced Engineering Informatics" journals was that they were among the most widely published journals in the field of information and communication technologies in the construction sector.

First of all, the authors have separated the keywords of each article. As a result of this separation process, the researchers have reached a total of 5942 pieces of different keywords. Figure 1 shows a word cloud created before preprocessing of keyword data.

As expected, "Building, Construction, BIM, Analysis, Data, Management and Detection" are most repetitive words in the word cloud.