

# Literature Review on Use of Simulation Modeling for Scheduling in Construction Management

Abhilash A. Jangalve<sup>1</sup>, Hemant H. Salunkhe<sup>2</sup>

<sup>1,2</sup>Department of Civil Engineering, Savitribai Pune University, D.Y.Patil Institute of Engineering, Pune, Maharashtra, India.

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**Abstract** - This paper is the study of Literature available on the Simulation modeling in construction activities. Simulation has been used for various tasks in construction. Scheduling of the construction activities is very complex task. And there is need for considering various variables in scheduling. Construction activities cannot be predicted precisely as there are many uncertainties at the time of actual construction of the project. Simulation modeling can be used to develop more precise schedule of construction project activities.

**Key Words:** Flexsim, Simulation, Construction Management, Simio Software, 3D simulation

## 1. INTRODUCTION

Construction project has lots of challenges and delivering project on time in specified budget is the goal of the each and every project. However this is very difficult task to deliver project on time. Construction activities detailed schedule is major tool that has been used to achieve this goal. In traditional approach the scheduler required lots of data to create most accurate schedule. And there are many chances that many risks are unnoticed in the schedule prepared. Simulation based schedule helps to reduce these risk.

Scheduling of construction activities is very complex process and many factors needs to be taken into account for accurate schedule. A critical problem with the traditional scheduling approach of optimization-based scheduling is that it requires that all the data be fully known and deterministic.

To protect against delays, the scheduler must buffer with some combination of extra time, or capacity; all adding cost to the system. Simulation-based extends traditional scheduling to fully account for the variation that is present, and provides the necessary information to the scheduler to allow the upfront mitigation of risk and uncertainty.

Flexsim is the software program which is used for various types of simulation operations and has been shows greater results in the sector of healthcare, transportation, manufacturing etc. this paper will focus on its applications in the construction sector.

## 1.1 Need of the study:

Simulation is being used in construction for many activities but it has not been prominently used in the development of schedule. There as be very less research on this topic.

This study will use the simulation based schedule in the construction of Hospital and Hotel rooms. And check if simulation based scheduling can be used in the construction activities.

This paper is the summary of the literature review studied for project.

## 1.2 Objectives:

To study the literature available on the topic of simulation and its use in the construction simulation

## 1.3 Methodology:

Following is the methodology adopted for the development of the simulation model.

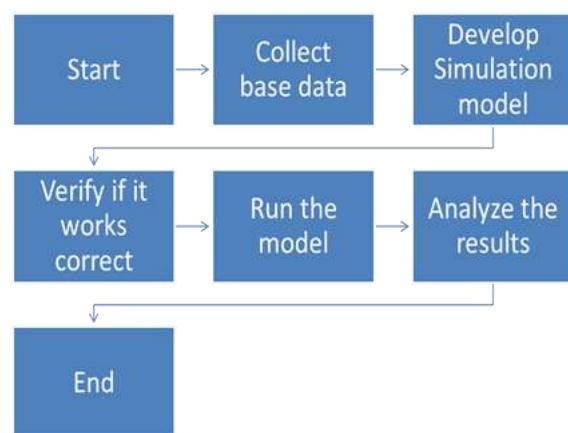


Chart I: Project Flow Chart

## 2. LITERATURE REVIEW

### a)"Simio: A New Simulation System Based On Intelligent Objects," Dennis Pegden

This paper describes the new modeling system SimioTM- which is used for simulation modeling. The paper describes the advantages of the new system, how the simulation modeling has changed from process oriented to an object orientated modeling. The paper gives the brief introduction to the Simio framework

### b)"3D Simulation Analysis of Patras New Port Operations in SIMIO Platform Environment," Mandalaki, Manesis

In this paper the application of simulation using Simio software for the preparation of the schedule of activities at the Patras port has been documented. The results shows that there has been a benefit of using this simulation modeling as it was able to reduce the waiting time for the passengers and the vehicles. The paper gives brief methodology for the development of the model. And the results that are obtained after the simulation run has been show.

### c) "Adaptive Real-Time Tracking and Simulation of Heavy Construction Operations for Look-Ahead Scheduling," Lingguang Song

This paper is about real time tracking and simulation of the heavy construction operations for preparation of the schedule during the construction operations. For development of the model continues data of the construction activities has been collected using tracking sensors and this data has been used as input for the simulation model.

Because of using real time data it allowed schedule to be modified according to the real time situation and develop most accurate look ahead schedule.

### d)"Identifying Cost Reduction and Performance Improvement Opportunities Through Simulation," J. E. Brown and D. Sturrock

This study shows how the simulation for the production lines of the HVAC manufacturing unit has been benefited. Using Simio based simulation it was possible to increase the outputs and decrease the operation cost.

Through the use of Simio and its analysis the Deloitte team has discovered the opportunity to improve throughput by 41% and reduce the work in process by 36%.

### e)"Simio Applications in Scheduling," Renee M. Thiesing C. Dennis Pegden

This paper focuses on the applications of the Simio simulation in the scheduling.

This paper shows how the mathematic based simulation differs from the simulation models.

The paper gives the brief information about the type of schedules generated form the Simio software. Various terms used in the report that is generated after the simulation runs.

### f)"A Flexsim-based Optimization for the Operation Process of Cold Chain Logistics Distribution Center" X. Zhu, R. Zhang, F. Chu, Z. He and J. Li

In this paper Flexsim software is used to find out the bottleneck and idle resources for the cold- chain logistics distribution process.

This paper provide measures to make the turnover rate of the cold chain goods & using rates of equipment and workers increase greatly.

### g)" A non-queue-based paradigm in Discrete-Event-Simulation modelling for construction operations" Hamed Golzarpoor, Vicente A. González, Michael O'Sullivan, Mehdi Shahbazpour, Cameron G. Walker, Mani Poshdar

In this paper a NQB Conceptual modelling approach for construction which defines the decision making mechanisms has been proposed.

## 3. CONCLUSION

Various papers on the simulation in scheduling has been studied. It has been clear the application of the simulation in the scheduling has many benefits and it is possible to reduce the risk associated with the scheduling problems in various industries. However it was found that the literature available on the application of the simulation in construction scheduling has found to be insufficient and there is scope for the applications of 3d based simulation using Simio or flexsim software in the generation and mitigation of the risk in the construction projects.

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