International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 08 | Aug - 2021 ISSN: 2582-3930

INTEGRATED SYSTEM ON NON-REPETITIVE AND NON-LINEAR PROJECT SCHEDULING WORK

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Abstract - In most residential construction projects, the design of the production system is based on linear assumptions across regions and floors to create an acceptance plan and production line accordingly. However, in practice this is difficult to achieve due to non-linear and non-repetitive design. The purpose of this work is to identify the key design issues of the integrated system when the planning team faces such projects. In order to achieve this goal, the planning method is based on the analysis of the complex structure of the production system, including: task diversity, task interdependence, supply chain interdependence, and work density. One modeling case study is introduced; First of all, the completion stage of industrial projects presents a one-time project challenge, that is, non-repetitive projects can be viewed as multiple non-linear, repetitive steps.

Key Words: Construction, Scheduling, Repetitive, Production unit, Resource, non unit repetitive project, system design.

1. INTRODUCTION

Construction projects are generally divided into linear, non-linear, repetitive and non-repetitive. On the one hand, repetitive production line projects are projects in which all operations and services are the same in every location. On the other hand, non-linear, iterative designs are common. In contrast, one-off projects are characterized by uneven performance and results at almost all locations. Housing projects also have disposable components, such as general-purpose components in garages and MEP systems these projects use a Critical Path Method (CPM) master diagram with multiple final parts for contract management, and some countries have developed standards that recommend it as a best practice for time management. It is well known that CPM cannot analyze the processes in the production system at the operational level. The most criticized aspects are (I) lack of attention to work processes, (ii) ignorance of productivity, and (iii) ignorance of work inequality. , (iv) Deteriorating resource management and (v) Inefficient repetitive projects Tactical scheduling and production lines have become planning methods to overcome some of these problems. TTP is one A technology adapted from the Lean industry, where cycle time is a parameter that represents the unit of time required to produce a product to meet the demand level. The line is adjusted to the performance bottleneck; therefore, a continuous workflow is defined. Therefore, the activities occur in different locations and have the same number of resources combines streamline planning with CPM to maintain on-site workflow by delaying the start date of tasks. Due to the uneven workload between regions and various activities, manufacturing or production lines and repetitive projects will encounter problems with non-linear projects. In addition, in the case of one-off projects, the problem will be more serious due to hidden locations, unique activities, complex architectural designs, combination of building materials, extensive services, and a wide range of specialty retailers. This makes the production system unpredictable, and the required extraction system becomes a push system. Some people claim that TPP and flow pipes have been successfully applied in non-repeatable projects. Implemented TTP in the hospital project and found that appointments are possible and useful, but it is impossible to identify locations with the same workload to solve the bottleneck. However, the case studies presented do not reflect the interaction of activities in one-off projects.

Variety of responsibilities:-This consists of the kind of sub-structures within side the project, kind of responsibilities in keeping with location, and one-off products.

Task interdependence:-Network of sports on the operational degree is pooled, sequential, or reciprocal.

Supply chain: - interdependence Variety of alternate contractors and their involvement with prefabrication, layout changes, or incomplete designs.

Work density disparity: - Depends at the scope of labor in keeping with area. The variety of crews and their capabilities, and alternate's method and methods

Aim:

Variety of responsibilities:-This consists of the kind of sub-structures within side the project, kind of responsibilities in keeping with location, and one-off products.

Task: - to solve sequential issue

Supply chain: - interdependence Variety of alternate contractors and their involvement with prefabrication, layout changes, or incomplete designs.

Work density disparity: - Depends at the scope of labor in keeping with area. The variety of crews and their capabilities, and alternate's method and methods

Objectives:

- To find out the better representation of project.
- To find work continuation and project deadlines
- Flexible planning of overall scheduling.
- How to resolve cost optimization of project.

2. METHODOLOGY:

These projects use the Critical Path Method (CPM) with multiple final parts for construction management, and some regions have developed standards that recommend using it as a best practice for time management. It well known that CPM cannot analyze the workflow in the production system at the operational level. The most criticized aspects are to overcome some of these problems.

(i) lack of attention to the workflow,
(ii) Ignorance of the production rhythm, and
(iii) Ignorance of the inequality of on-site work
(iv) Deteriorating resource management and
(v) Inefficient repetitive projects Tactical scheduling and production lines have become planning methods

Therefore, the activities occur in different locations and have the same number of resources. Maintain the workflow by delaying the task start date Non-linear and non-repetitive projects are a challenge for contractors. In repetitive projects and non-linear design problems can arise due to uneven workload and discrete actions between regions. In addition, unobvious locations, unique events, complex architectural designs, combinations of building materials, diverse services, and diverse specialty retailers are the problem of one-off projects. As a result, the production system becomes unpredictable and the required extraction system becomes a push system. Some people claim that TPP and flow pipes have been successfully applied in non-repeatable projects. (2013) Implemented TTP in the hospital project and found that scheduling is feasible and beneficial, but it was unable to identify the location with the same workload to solve the bottleneck

Case study

In this case study example is a small industrial project with a mixed concrete work and steel structure work defined by (1) foundation, (2) superstructure and (3) steel roof, as shown in Figure single concrete structure and steel structure. The second level of established by identifying the three positions of each unit. The second example shows a problem with non-repetitive items. This includes unique products and high-level supply chains interdependence,

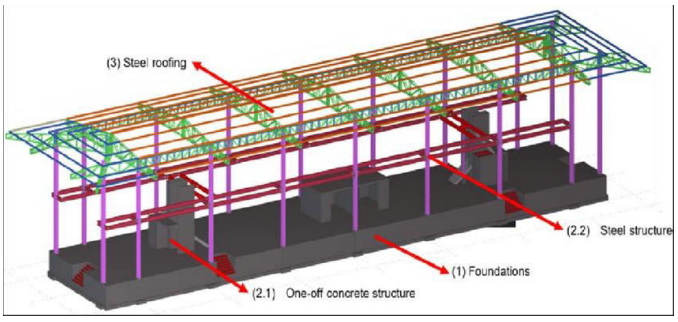

Fig -1: individual task in construction building

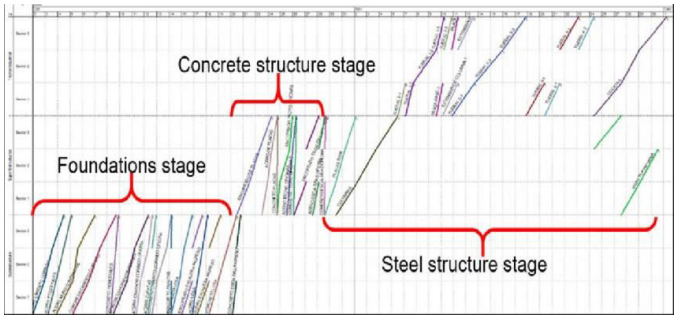

Fig -2: Non repetitive work scheduling

For example, steel, hardware those complete parts during construction, various equipment suppliers, and off-site manufacturing. The plan which requires commercial contractors not to start work until their predecessors are fully completed each of these commercial contractor works independently of other commercial contractors. This becomes critical when installing a single product, because the more subsystems, the more stages in the master plan, and the longer the project duration. Follow the order-dependent components; however, operations at the operational level exhibit a high degree of uncertainty, consistency, and interdependence in the supply chain; for example, it depends on the availability of resources

DISCUSSION

In the initial simulation, there is a moderate diversity of tasks and commercial contractors. In addition, one problem with non-linear systems is the design of group, because of the mismatch of working density between regions. The staff is permanent, and the productivity will be high at the maximum point and low at the minimum point and cannot handle arbitrary work shifts. Therefore, LBMS seems to be a design strategy for manufacturing system because it can use persistent resources between sites. Finally, if the system is allowed to manufacture components in advance, the dependence in the supply chain can be minimized; however, this requires a standardized design and installation strategy to reduce errors and improve quality. In this case study, the interdependence of grouping and sequence was observed among stages, but within these stages, the interdependence was low, and the sequence interdependence was high. It is also suggested that due to the scale of the project, the general contractor must complete the foundation before the steel contractor starts to build the pillar; however, if the project is large enough, it is recommended to split the product into multiple parts as much as possible. One of the products must be planned together because it can rarely be broken down into parts. It also requires detailed analysis and iteration to gradually identify identical or comparable locations-where collaborative BIM can be successfully used. However, the challenge is to predict performance when assembling complex parts.

CONCLUSIONS

This research provides a framework for using lean technique to design and manufacture systems for nonlinear & non-repetitive design. The step is to identify interdependencies between commercial contractors, as this interaction becomes critical in some area. The density mismatch of is a key factor in the design of the production system, because it will result in different levels of productivity in different locations, as well as crew downtime. The simulation shows that the streamline planning method is more appropriate when the team is planning a nonlinear project. This is due to the streamline being able to handle permanent manpower and use temporary buffers. However, due to the dependence in the supply chain and the difficulty of predicting productivity, each location is highly unstable. Therefore, the design of manufacturing system is based on the degree of coordination of different concepts of complex systems in the planning process.

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