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A Review of Building Time Schedules for manufacturing textile By Estimating Production Rates Using Simulation for Iraq case study

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ABSTRACT

Abstract: Lack of knowledge and experience in manufacturing management techniques, such as productivity measurement by scientific methods, during preparation of time schedules produce many problems during the implementation of textile projects in Iraq.Nowadays, a large number of companies are changing their production systems to this new reality. There are several tools in the market to support the decision to plan and control the production. This paper presents a study for a Building Time Schedules for manufacturing textile By Estimating Production Rates Using Simulation In Iraq.

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INTRODUCTION

This review will look into project scheduling which determines the production rates by means of process simulation.

Part 1: Project Techniques and Productivity:

Project Management Process:

According to Kohli (1996); "project management is the process of planning, scheduling, organizing, leading and controlling the efforts of members, and use of other organizational resources to achieve set goals". Cleland (1999), adds that, project management is the art of directing and coordinating human and material resources throughout the project by using modern management techniques to achieve the set objectives of scope, cost, time, quality and participant satisfaction.

Furthermore, Coats and Sansom (1999).

Project Scheduling:

Poskitt (1986) defines scheduling as the procedure of deciding the real time periods amid which the exercises are planned to occur. Kohli (1996) adds that project planning is a vital piece of the arranging procedure.

Hinze (1998), defnese schedule as a timetable of activities to be done.

Therefore project scheduling is a vital part of the decisions part of the project group's occupation.

Activity Duration:

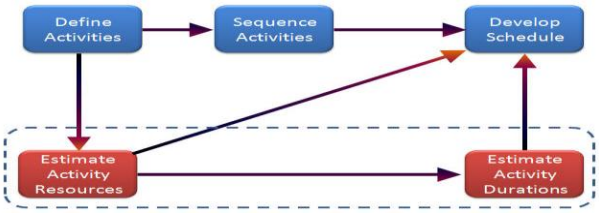

Fig. 1: Activity duration estimation

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Hinze (1998) states that the activity duration is frequently tied directly to the resources connected to them and the productivity of these resources Erik and Clifford (2014).

Techniques of Scheduling

techniques that are used project scheduling are:

Bar chart, Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM).

1. Bar Chart:

Henry Gantt was the inventor of the Gantt chart Mawdesley *et al*. (1997). Which is the oldest planning tools. It is clear, simple and easy to interpret. Bar charts require less correction and upgrading than more complicated systems Abbasi and Al- Maharma (2000). However, Wei Lee (2004) Argues that, it is constrained as a control tool because it is difficult to use it for forecasting the impacts that changes in a specific activity will have on the general schedule.

2. Program Evaluation and Review Technique (PERT):

Based on breaking the project down into individual segments (activities). In general, the time-span of every activity will be estimated using the following three aspects; time reflecting the pessimistic, optimistic, and most likely values of the duration Erik and Clifford (2014).

3. Critical Path Method (CPM):

According to Hinze (1998) the Critical Path Method "CPM" recognizes the chains of activities in the project that will define how long a project will take. It the opportunity to closely analyze the sequential logic and timing of all operations that have to be completed for a project before committing time, equipment, material, labor, and money Barrie and Paulson (1992). Ahuja (1994) and Hendrickson (2000) adds that it is better to provide the bar chart with a CPM schedule because it calculates the minimum finishing time for a project together with the beginning and ending period for project activities.

Productivity Concept:

Production is a specific quantity or value during a certain period or the absolute output, while productivity is the ratio of the relationship between output and input, it's a rate link between output and the time unit Saiful (2013). Productivity is defined as a concept in which we can measure the extent of good using of the productive resources Giljum *et al*. (2010).

Stevenson (2011) says "productivity is a measure of the active use of resources and often express by the proportion of output to input. And Chase and Aquilano (2001) define productivity as a proportion of the client to the product cost. Where Bilal (1991) defines its 'as measuring the quality of the pooling of resources in organizations and exploiting it to achieve a set of results, beside seeking to reach the highest level of performance with minimal expenditure of resources." And Mark (1984) says "productivity is the efficient use of resources to achieve outputs".

1. Productivity is the Ratio of Output to Input:

Spring (2011) define it as output to input, while Robinson (2002) define it as output to input ratio, and Wilson (1994) delineates as "the proportion of producing outputs to the resources used inputs in their production, where productivity in this concept considered as a measure of efficiency, as defined by Morley (1986)" And Sink (1985) describes it as "the relationship between the produced quantity of a given system during a given period of time, and the amount of resources used to produce this amount of product in the same period." While Mundel (1983) define it as "the proportion of producing output used outside the "the proportion of producing output used outside the organization to the amount of used resources. The concept of productivity from viewpoint of, Kongkiti (2013) is shown below:

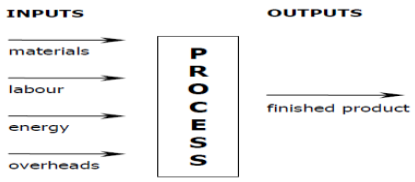

Fig. 2: Productivity ratio

2. Productively Include Efficiency and Effectiveness:

Productivity concern with both effectivenees and efficiency Robbins (2013).

Efficiency is the ratio of actual production to the typical production while effectiveness is the degree of reaching the goals, where Bain (1997), McGee (2006) see that productivity, includes efficiency and effectiveness and is expressed as:

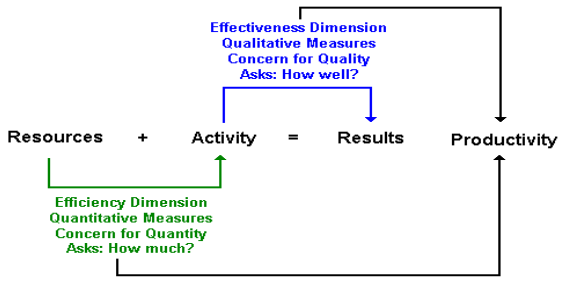

Fig. 3: Productivity,effectiveness& fficiency

Measurement of Productivity:

Barnes *et al*. (2013), and Bain (1982) argues successful measurement of roductvity must considered such as: Field of application

- Target of the activity
- Field of comparison
- Precision
- Inclusive
- Timing
- Honesty
- Objectivity

Advantage and Limitations of Productivity Measurements:

Dependency in the measurement of the total productivity shows the efficiency of converting the input elements to outputs, but does not explain the reasons for the change in productivity across different time periods, while relying on partial productivity shows the extent of productivity development of the element and the extent of its efficiency, but any change in one of the factors affects the productivity of other factors. Myronenko (2012) and Bilal (1991) believe that if the organization measured the total productivity, and then followed up the measure of partial productivity, it will find the elements that caused the increase or decrease of productivity.

Productivity Cycle:

Smanth (1984) divided the productivity cycle into four phases as a continuous process:

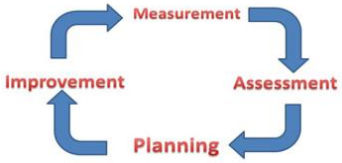

Fig. 4: Productivity cycle

Factors Impact Productivity:

There are two factors:

Technical factors and human factors. Al Ali (1983) sees that productivity is affected by many factors, with various nature of these factors, are unstable, so they are varied according to the economic, social and political variables. Selmi (1996) refers that improving productivity is only possible when perform the correct business, in the correct way, Gundecha (2012) explain other factors that affect productivity, and he mentions about (14) factors, while Sullivan (2013) refers to more than (20) factors.

Improvement of Productivity:

By removing the existed barriers that prevent the exploitation of resources for the producing of ideas, products or better working conditions, It means the ability to generate more results without increasing labor, resources, money, time or energy.

Parvin (2011) refers to productivity improvement can done by several methods and all these methods depend on job satisfaction. While Nasr (2004) and Helms (1996) add three ways to increase productivity.

Part 2: Simulation:

Introduction:

Whereas Kelton (1998) identified it as the simulation of the real world in miniature, and often uses the computer, and Naseer (2004) defined simulation as "a method of quantitative analysis is suitable to deal with complex problems," and as defined by Kubaisi (1999).

Quantitative Methods:

Quantitative methods, are a mathematical method through which we can solve the economic, administrative, and marketing problems with supporting of the available resources of data, tools and methods that are used by decision-makers Saeed (2007).

It methods to ensure the accuracy that guide decision-makers in determining the best possible

solutions to the problems Al-Naimi (2008).

Decision-making:

The decision-making process is one of the main responsibilities of the manager that requires human own thinking and innovation Moussa (2010).

Relevant Studies:

1. Quantitative Methods and Decision-Making Studies:

Fethi and Pasiouras (2009), their study aimed at a comprehensive review of 179 published studies during the period from 1998 to 2008 from different countries using operations research and artificial intelligence in the banks performance evaluation and The results of the studies was based on the profit efficiency and the productive capacity efficiency.

Lee *et al*. (2008), in their study to support quantitative methods, intuition in decision , their results showed that decision-making is one of the most important management skills with the ability to exploit the available sources most suitable ways and harness all efforts to achieve optimal performance efficiently.

Jane *et al*. (2008), this study comes as a result of the efforts of a group of international organizations working in the area of health and research simulate integration of operations research with models of operations research, to be included as part of the follow-up and evaluation efforts.

Fuller and Martinec (2005) in his study aimed to discuss the development of using operations management and operations research for organizations in the USA. The results of the study: Both of operations research and operations management gives the index towards a focus on the administrative aspects and downplay the techniques and tools in solving problems, operations research and management far in its philosophy that we're not separate from the tools and techniques used.

Brown *et al*. (2005), the study explained the Chinese wool textile industry, showed the mathematical model helped managers to make appropriate decisions, about what are the types of fiber, which can be mixed to produce low cost new fiber.

2. Simulation Studies:

Erüyrük (2012), in his study to design an assembly line of garments by simulation techniques and statistical data Showed the benefit of a simulation to design, assembly lines in the clothing industry in which reducing the number of workstations from 34 to 29.

Atan *et al*. (2012), the study showed the importance of the use of simulation in the garment industry in Malaysia, because this industry is characterized by continuous changes in the styles, which limits the use of automation, and pointed out that reducing the cycle time is a key to competitiveness that impact the price and time of delivery, where the program that used is Pro-model for a single product. Showed that there is a very high work in process, so the study recommended the needed to reduce the cycle time by reducing setup time and the time to move operation.

Balcombe (2004), in his study Showed that there are more than 12 companies producing drugs by using the manufacturing and experimental simulation to be trained in manufacturing, preparing and testing medicines.

Cao (2003), Showed the relationship between the checking within the airport for passengers and their delay to get the planes. Also, it showed the effect of the system's parts on its crowding and forming the bottleneck.

Hermann *et al*. (2000), the Study has talked about the importance of simulation as a tool to solve many administrative problems. It helps in the decisions on operational scheduling, selecting the appropriate space of land, and the number of machines for the factory.

Steps to Solving Problems Through Simulation:

The figure (5) below shows the steps to build simulation models, Banks *et al*. (2009) and Shannon and Sadowski (1995).

1- Problem Identification:

The process of simulation begins with identification the problem Law and, by the client, and then transferred to the simulation analyst .

2- Setting Objectives and Overall Project Plan:

This phase is called the preparation of a proposal which need for identification of work team which will work on setting the objectives.

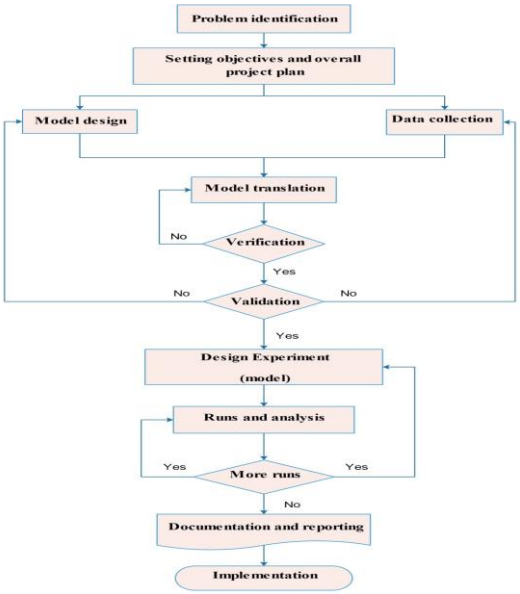

Fig. 5: Steps to build simulations

3- Model Conceptualization (Design):

At this stage, simulation of the real system is made by a mathematical and logical model, the system has initially on access terminals, wait stations processing, transportation and handling materials, and then the special requirements.

3- Data Collection:

After client accepting the proposal, tables of data are prepared that need to be obtained.

3- Model Translation:

At this point the prepared model as mentioned in the third step is transferred to a computer program intended.

4- Verification:

This process ensures that the operation of the model reflects the real process.

5- Validation:

This process ensures that the model gives the same results of the real system.

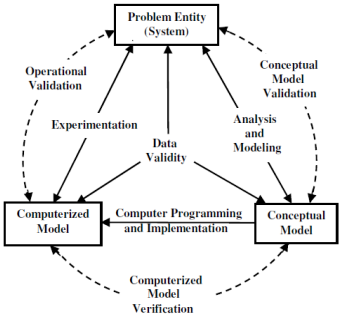

Fig. 6: Modeling process

6- Design Experiment (Model):

At this stage, test different alternatives to get the results that need to study and decision.

7- Runs and Analysis:

The operation of the system, runs in several times to check and compare the results.

8- More Run:

Completed operations in the previous stages and by the decision of the analyst to carry more operations on scenarios that are in need for simulation.

9- Documentation and Reporting:

Documentation is necessary about system works and for future references.

11- Implementation:

At this stage, the model is applied, reporting, and system analyst works on obtaining the client with the maximum possible information to enable him to make a decision.

Advantages and Disadvantages of Simulation:

1- Advantages:

Winter *et al*. (2012), Naseer (2004) and Banks (1999) Simulation models combine the basic mutual relations in the real system.

- Simulation allows asking questions such "what if ".
- The system will built from the perspective of the client.
- Can be used to solve many problems such as storage, transport etc.
- Conduct experiments on different variables to determine the most important.
- Enables to control complexities of the real world problem.
- Enable to know the results of the different decisions before they happen.
- Enable to conduct experiments on large samples.

2- Disadvantages:

Winter *et al*. (2012), Naseer (2004) and Banks (1999).

- Requires a thorough knowledge of the problem and the system.
- Timely and cost of the establishment of model.
- Model built to solve a specific problem won't solve another.
- Cannot be guaranteed to reach the optimal solution.

Conclusion:

From the study it can be clearly concluded that, the building of time schedules for manufacturing textile by estimating production rates using simulation in Iraq was one step ahead towards increasing output and quality of textiles. Machines tackle different parts of textile manufacturing materials like rolling, wrapping, sewing, coloring, and printing. There is the potential for a decent measure of machine down-time and the likelihood of needing to re-run the creation in light of the fact that a clump fizzled. Planning environment is static. In numerous generation and administration frameworks, plans must be updated habitually in light of both quick occasions, which happen abruptly, and expected occasions where data is given in progress by, for instance, procedure control PCs or clients. In this paper, we build up a structure for taking care of constant data concerning expected future occasions. Note that in this case the season of entry of the data is critical in choosing the best timetable update method to embrace. To enhance administrative choice making, Gantt made imaginative graphs for imagining arranged and real generation.

As indicated by Cox *et al*. (1992): a Gantt graph is "the soonest and best known sort of control graph particularly intended to show graphically the relationship between arranged execution and real execution. The staggering force of data innovation to gather, picture, process, and offer information rapidly what's more, effortlessly, which has improved a wide range of choice making procedures.

These occasions have driven, in many spots, to the decay of shop foremen, who used to manage production lines, and to programming frameworks and enhancement calculations for generation planning. Simulation brings about productivity and enhances the time scheduling. There are a number of benefits that can be derived from it and if it is properly implemented, it can increase both output as well as the quality. However, there are a few shortcomings that needed to be ailed. These can be eliminated through effective training and use of appropriate technology and manpower. Therefore simulation stands to be one of the best ways to control and build time schedules in the textile industry.

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