

Dedication



إلي من ثبتوا المبادئ والديّ

إلي اشقائي الأعزاء : عصام - نجوي - خالد -
عمر

إلي شريكة حياتي: زوجتي

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وإلي كل من علمني
.....

أهدي هذا الجهد

Acknowledgement

I am deeply indebted to Dr. Ahmed Elamin Haroun and Dr. Salma Yehia M. Mahmoud who kindly supervised and encouraged this research and who gave much of their valuable time for revising this thesis.

Acknowledgement is due to Dr. Mudathir Suleirnan and Dr. Awad Saad who gave me valuable advices.

Thanks are due to Dar Consult Engineers (Eng. Hasaballa, Eng. Abu Aglaa, Eng. Emad Elharalo and Eng. Omer Abdeen) who gave me valuable data for my research.

Thanks are also extended to Execution Unit of Merowi Dam Engineers (Osama Wadidi, Mohammed and Ali) also to resident engineer in EL- Fateh Tower Project (Engineer Loay Osman) who gave me much valuable data and to all who encouraged me to carry on with .this research.

Abstract

In Sudan, the clients, contractors and consultants (Three Main Parties) of the construction industry are generally suffering from project time overrun specifically in the case of limited resources. This ultimately leads to overall project cost overrun.

Within this context, the objectives of this research are twofold:

1- To plan and control none repetitive project time through scheduling and time optimization while considering constrained resources.

2- To develop a heuristic based on experience of Sudanese construction industry to optimize scheduling of none repetitive projects.

To achieve the optimum balance between the increasing need for minimum project time completion while the project is subjected to limited resources, this study developed a heuristic model for none repetitive projects applicable within the Sudanese construction industry.

Ten cases were studied for actual none repetitive construction projects that have been executed in Khartoum and other major towns in Sudan. Each project was described in details (i.e. number of activities , resources, durations, target time of completion , expected cost and so on) The actual studying models-ASM (project as case studies) were built up, then Primavera program was used as a simulator tool that made it possible to produce simulation product models-SPM. This model was then adapted using sixteen selected heuristics and was then applied to the ten mentioned projects, Statistical and operation research tools were then used in combination with existing heuristics and the common practices in construction industry in Sudan.

Lindo program as a decision making program is also used which made it possible to reach the optimum solution of increasing needed time at its minimum rate to complete the project under resources limitation case. Then the results were evaluated as follows:

- The optimum solution of increasing needed time at its minimum possible rate to complete the project under limited resources is achieved due to the implementation of the heuristic of minimum late start time as a single heuristic.**

- The second optimum solution is achieved due to the implementation of the heuristic of minimum late start time plus minimum total float time as a dual heuristic.
- The third one is achieved due to the implementation of the heuristic of minimum total float time as a single heuristic.
- The other heuristics are organized in a specific criteria according to their effect in optimum solution.
- From above its clear that this study allowed the development of a new heuristic based on the research results and as applied to the Sudanese construction industry to optimizing scheduling of none repetitive projects. It was also possible to plan and control none repetitive projects through scheduling and time optimization while considering constrained resources, so the optimum balance between increasing need for minimum time to complete the project when the project is subjected to limited resources is achieved.

مستخلص الدراسة

ظل اطراف مثلث التشييد (المالك والمقاول والاستشاري) في السودان يعانون من مشكلة التحكم في زمن المشروع (Project time control) بصورة عامة وفي حالة الموارد المحدودة او المقيدة بصورة خاصه ، الشيء الذي يترتب عليه تاخير زمن اكمال المشروع ومن ثم ارتفاع تكلفتة الكلية في نهاية الامر.

عليه فإن اهداف هذا البحث يمكن تلخيصها فيما يلي:-

1. تخطيط وادارة زمن- المشرع غير- المتكررة من- خلال الجدولة المثلى- والزمن الأمثل في ظل الموارد المقيدة.

2. الوصول لفرضية (Heuristic) تعتمد على خبرة صناعة التشييد السودانية بغية الوصول للجدولة المثلى للمشاريع الانشائية غير المتكررة .

وللوصول للموازنة المطلوبة المثلى بين العد- الادنى- للزيادة الزمنية- المطلوبة- لاكمال زمن المشروع وكمية الموارد المتاحة- المهوددة- فإن هذه الدراية قد- توصلت لفرضية (Heuristic) تعمل على حل هذه المشكلة لمشرع التشييد غير المتكررة من خلال معطيات صناعة التشييد السودانية.

لقد تمت- الدراية- والتطبيق الفعلي- والعملي- للفرضيات المختلفة- على- أكبر وأحدث عشرة مشاريع انشائية غير- متكررة- تم- تنفيذها في- السودان داخل- العاصمة الخرطوم وبعض المدن الكبرى الأخرى.

لقد تم استخدام برنامج البرايڤفيرا (Primavera) كبرنامج محاكاة قياسي. وباستخدام ستة عشر فرضية (Heuristics) مختلفة في شكل الحدي وثنائي وثلاثي. ثم تم عمل الضغط الاحطئي المطلوب. بعد ذلك تمت الاستعانة بأساليب بعوث العمليات وتقنياتها للمساعدة في اتخاذ القرار الأمثل. ثم تم استخدام برنامج (Lindo) كأحد افضل برامج اتخاذ القرارات للوصول للفرضية المثلى.

ومن خلال النتائج فإنه أمكن التوصل للآتي:-

1/ الحل الأمثل الاول للزيادة الزمنية المطلوبة لزمن اكمال المشروع في حدها الأدنى. تحت ظل الموارد المقيدة امكن تحقيقه عبر فرضية احادية (Single heuristic) هي فرضية أقل زمن بدء متأخر (Minimum late start time).

2/ الحل الأمثل الثاني امكن تحقيقه عبر فرضية ثنائية (Dual heuristic) هي لاقل زمن بدء متأخر اضافة لأقل زمن راكم كلي. (Minimum late start time + Minimum total float)

3/ الحل الأمثل الثالث امكن تحقيقه عبر فرضية احادية (Single heuristic) هي فرضية أقل زمن راكم كلي (Minimum total float).

4/ الفرضيات الاخرى تم ترتيبها وتنظيمها معياريا (Organized Criteria) وبشكل تنازلي اعتماداً على قوة تأثيرها في الحل الأمثل الذي تم التوصل اليه.

وعليه و من خلال النتائج اعلاه فإن هذه الدراسة اتاحت التوصل لفرضية جديدة اعتمدت على نتائج البحث في صناعة التشييد السودانية للمشاريع الانلثئية غير- المتكررة الشيء الذي يتيح امكانية التخطيط- والتحكم- في- زمن- تلك- المشرع من خلال الجدولة المثلى والزمن الامثل في ظل تقييد الموارد.

ومن ثم فإنه امكن تحقيق التوازن الامثل (Optimum balance) المطلوب بين الزيادة الزمنية- المطلوبة- لاکمال المشروع وفي- حد-ها الادنى- عند-ما يكون المشروع تحت ضغط مشكلة الموارد المقيدة.

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