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POTENTIALITY FOR THE APPLICATION OF VALUE ENGINEERING IN CONSTRUCTION INDUSTRY IN SUDAN

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Dedication

I dedicate this work to my colleagues, engineers and architects, and to my students hoping to be of value and an addition to the construction management.

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ABSTRACT

The world now becomes as one village due to the continuous progress in the field of technology. Sudan being one of the third world countries, is striving to find a place among the developed countries in spite of the complicated world conditions economically and politically.

If this is the case, Sudan should utilize to the utmost extent the local resources and to adapt with the prevailing conditions in the world by using new technology.

To conserve the numerous resources and potentialities available in Sudan, we have to know the new techniques conducted in the developing countries to promote the overall performance in different fields of production specially construction industry. In fact, construction industry is the basic pillar for other industries and hence, great attention should be given to the problems of quality and cost to compete in this dynamic world.

The objective of this research is to study value engineering (VE) and to investigate its effectiveness in improving the design process which is considered as the most important factor in the construction process. It is worth mentioning that the impact of design on the total cost of the project is 50% as reported on the findings of the literature review.

Value engineering (VE) can be defined as a problem solving methodology which was applied in various parts of the world to the construction practices and it proved its effectiveness in optimizing costs and keeping acceptable levels of quality. Value Analysis Methodology was developed in 1947 by a young engineer, Lawrence Miles, at the General Electric Company in U.S.A. Due to the shortage in materials which had happened as

a result of the Second World War, he was assigned to design parts from the available raw materials. Instead of focusing on the actual part he was responsible for designing, he focused attention on the function that it had to perform. He found that the end result was invariably simpler, more economic and performed better.

The research included structured interviews conducted among 15 design firms, construction engineers and clients to investigate the design process and to find its weakness and deficiencies. The questions were set to investigate to what extent VE components were applied on those projects under study and their impact on design. The collected data was then analyzed statistically using ANOVA and Chi-square methods.

The current techniques of VE were applied in two projects as elaboration to clarify how these techniques are carried out.

Discussion of the results, recommendations and suggestions for further studies were presented in the last chapter of this research.

تجريـــد

تطبيق الهندسة القيمية في مرحلة التصميم

أصبح العالم اليوم كالقرية الواحدة نتيجة للتقدم المضطرد و المذهل في مجال التكنلوجيا. و السودان كواحد من أقطار العالم الثالث يتطلع ليجد له مكانا وسط دول العالم المتقدمة بالرغم من الظروف العالمية المعقدة أقتصاديا و سياسيا. أذا كان الأمر كذلك فينبغي علي السودان أن يستفيد أستفادة مثلي من الموارد الداخلية و عليه أيضا أن يتأقلم مع الأوضاع العالمية و أستخدام التقنيات الحديثة.

في سبيل المحافظة علي الموارد المتعددة و التي خص بها الله سبحانه و تعالي السودان, علينا أن نتجه ألي معرفة الأساليب المستخدمة عالميا لتقليل التكلفة و تحسين الأداء في كل المجالات الأنتاجية و خاصة في مجال صناعة التشييد و التي تعتبر الدعامة الأساسية للصناعات الأخري.
يهدف هذا البحث الي دراسة الهندسة القيمية و معرفة مدي فاعليتها في تحسين عملية تصميم مشروعات التشييد كما وضح ذلك من الدراسات السابقة و التي أجريت في عديد من البلدان.
يمكن تعريف الهنندسة القيمية بأنها جهد جماعي منظم لأجل تحليل وظائف المشروع و مطابقتها لأهداف و متطلبات المالك و المستفيد و من ثم أبتكار بدائل تؤدي تلك الوظائف و تحقق الأهداف بأقل تكاليف ممكنة دون الأخلال بالجودة و الوظائف الأساسية.

يرجع اكتشاف الهندسة القيمية الي المهندس لاري مايلز الذي كان يعمل بشركة جنرال الكتريك بالولايات المتحدة الأمريكية. و في عام 1947 قام هذا المهندس بأبتكار بدائل ساهمت في تطوير المنتجات بأقل تكلفة, و بذلك أوجد حلا لمشكلة شح الموارد الأستراتيجية التي حدثت بسبب الحرب. انتشرت هذه التقنية في الولايات المتحدة الأمريكية ثم أوربا و بقية العالم بما في ذلك العالم العربي.

الهندسة القيمية هي عبارة عن أسلوب هندسي أداري لدراسة و تحليل و تقييم و طرح المقترحات العملية لرفع مستوي أداء المشروعات و تقليل تكلفتها بأستخدام أسلوب العمل الجماعي.

أفادت الدراسات السابقة أن تأثير التصميم علي التكلفة الكلية للمشروع يبلغ نسبة 50% . لهذا ركزت الدراسة علي مرحلة التصميم.

أشتمل البحث علي عمل أستبيان تم أجراؤه مع عدد 15 مكتب تصميم بالخرطوم لمعرفة الطريقة التي تتبعها هذه المكاتب في عملية التصميم و قد تم تحديد مشروعات تم تصميمها و تنفيذها و أستخدامها لأجراء الأستبيان و الذي شمل شركات المقاولات و أصحاب هذه المشاريع.
هدف الأستبيان أيضا الي معرفة الي أي مدي تطبق هذه الشركات عناصر الهندسة القيمية مثل الأداء الوظيفي, الجودة والتكلفة في عملية التصميم بالأضافة الي تحديد أثر تطبيق منهجية الهندسة القيمية علي مشروعات التشييد في مرحلة التصميم.
شمل البحث أيضا تطبيق منهجية الهندسة القيمية علي مشروعين مكتملين لبيان خطة التطبيق و الفوائد الناتجة من الهندسة القيمية.
التحليل الأحصائي و النتائج و ما توصل اليه البحث و التوصيات تم ايرادها في نهاية البحث.

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