

Design Transformation to Reduce Cost in Irrigation Using Value Engineering

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Abstract : Researchers are responding to the environmental challenges of Kuwait in localized, innovative, effective and economic ways. One of the vital and significant examples of the natural challenges is lack of water and desertification. In this research, the project team focuses on redesigning a prototype, using Value Engineering Methodology, which would provide similar functionalities to the well-known technology of Waterboxx kits while reducing the capital and operational costs and simplifying the process of manufacturing and usability by regular farmers. The design employs used tires and recycled plastic sheets as raw materials. Hence, this approach is going to help not just fighting desertification but also helping in getting rid of ever growing huge tire dumpsters in Kuwait, as well as helping in avoiding hazards of tire fires yielding in a safer and friendlier environment. Several alternatives for implementing the prototype have been considered. The best alternative in terms of value has been selected after thorough Function Analysis System Technique (FAST) exercise has been developed. A prototype has been fabricated and tested in a controlled simulated lab environment that is being followed by real environment field testing. Water and soil analysis conducted on the site of the experiment to cross compare between the composition of the soil before and after the experiment to insure that the prototype being tested is actually going to be environment safe. Experimentation shows that the design was equally as effective as, and may exceed, the original design with significant savings in cost. An estimated total cost reduction using the VE approach of 43.84% over the original design. This cost reduction does not consider the intangible costs of environmental issue of waste recycling which many further intensify the total savings of using the alternative VE design. This case study shows that Value Engineering Methodology can be an important tool in innovating new designs for reducing costs.

Keywords : desertification, functional analysis, scrap tires, value engineering, waste recycling, water irrigation rationing

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