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A DECISION SUPPORT FRAMEWORK FOR MANAGEMENT OF POWER SUPPLY SHORTAGES IN DEVELOPING COUNTRIES

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Overview

Since 2002, Cameroon has suffered from intense and repeated electricity shortages, in spite of its impressive hydro-electricity potential. The main deteriorations are the power brownouts and blackouts that became extremely frequent, especially during the "dry" season, when there is no rain (December to June). The French word "délestage" (power-cut) has come to stay in everyday vocabulary. The impact of the electricity crisis in the economy has been estimated as productivity decreased and reduction of economic growth by 1% in 2004.

Power quality and reliability issues are keys to the successful delivery of energy and to the formulation of policies relating to regulation and deregulation of the industry. Poor power quality, for example, affects computers and other sensitive equipment. Security is also a concern because of the growth of international terrorism.

The imperative of planning in electricity systems is to match dynamically the demand with supply. In developing economies, electricity systems are constantly resource constrained because of reasons including inadequate investments in new capacity additions, generation and transmission losses, unreliable fuel supplies, inadequate availability of water in the reservoirs, and Strong opposition from environmentalists.

Under these circumstances, matching the ever-increasing demand with existing supply alone becomes unattainable, and it becomes necessary for the electric utilities (supplier of electricity) to look for other alternatives. The decision support framework developed in this article utilizes Multi-criteria models to address Electricity supply and power reliability problems based on the case study of Cameroon.

Methods

A strategic decision plan is urgently necessary as potential solutions to the current supply deficit problems. We propose here a framework decision process for this plan based on the Management of priorities.

The decision maker is presented with a problem that requires a decision. The government and the Electricity regulatory agencies then provide certain goal and objectives. Also available are some existing policies and initiatives that satisfied the objectives in some way, as well as the options and alternatives action, each of which might be implemented to bring a solution the power shortage situation.

The decision making process tend to choose the alternative course of action that best meets or satisfies the objectives. Combination of various alternatives can be the most appropriate way for satisfaction of the objectives. From the evaluation and final prioritization, decision makers then make simple pair wise comparison judgments throughout the hierarchy to arrive at overall priorities for the alternatives.

For the plan to achieve the most appropriate outcome for society, many decision-making criteria need to be evaluated. The most appropriate solution is a Multi-criteria decision making (MCDM) model.
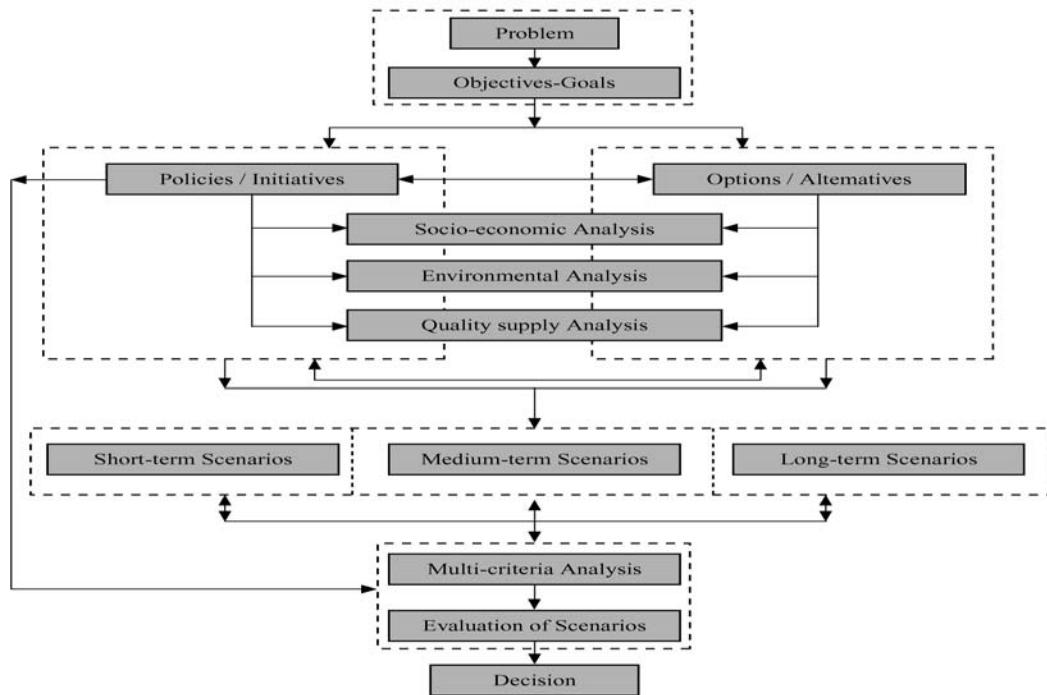
Results

Fig 3. Decision Making Framework

Conclusions

Power shortage problems in developing countries has become a new challenge for governments and utilities since a country cannot initiate economic growth without the electricity industry capacity to power the infrastructure and services industries. The situation has motivated the search of plan and development of innovative management and supply enhancement measures.

Effective plan for management of power shortages requires a comprehensive consideration of all related aspects, e.g., technical, social, environmental, institutional, political, and financial. The plan should encompass both short and long term horizons.

This research paper provides a comprehensive framework for performing the prioritization of alternatives or scenarios in a scientific and systematic manner for better management to power shortening. The prioritization process of the different energy policies is a multi-criteria decision-making problem that involves analysis and evaluation various criteria including environmental factors, customer concerns, and reliability issues. The method is capable of being employed by decision-makers in their comprehensive management of power shortages.