Abstract

Long-term strategic planning (LTSP) represents the process of determining a corporation long-term goals and then identifying the best strategies for achieving those goals. Uncertainty and complexity, which are arising from surprise external drivers, can never be completely eliminated from the strategic planning process. In addition, LTSP is fundamentally a process that helps policy/strategic makers to make systematic and well-informed strategic decisions under conditions of high uncertainty and complexity.

For strategic decision, there are different types of executive information systems (EIS) that are widely used in strategic planning process. These systems provide real-time and adequate information for decision making of a corporation, but it only provides the short term strategic decision. In addition, the majority of the current decision support systems aren't efficient and effective enough to provide the long-term decisions.

The integration between futures studies methods and strategic planning tools empowered policy/decision makers to prepare for the future by adapting to what might happen and controlling them. This integration provides to systematically explore and create both possible and desirable futures. Also, it can identify and assess the possible alternative available in the future.

Our research effort has the potential to enhance the current decision support systems capabilities to help policy/decision makers in long-term strategic decision. This enhancement deals with reducing the uncertainty and complexity to improve the quality of the future strategic decision, provide new levels of awareness situation and finally, allow a better understanding and confidence for possible alternatives that may lead to more efficient and effective decision making process.

We believe that one way to deal with the limitations of traditional support systems is to have *a novel integrated DSS framework* that allows policy/decision-makers to identify and evaluate all possible futures scenarios, the appropriate policies that can increase the future benefits and reduce its threats.

In order to do that, we developed and implemented a generic web-based intelligent collective decision support system (GWIC-DSS) framework, which enhances and integrates futures studies methods and strategic planning tools. It is based on enhancing the appropriate qualitative and quantitative futures studies methods, which are: ***Environmental Scanning (ES), Structural Analysis (SA), Real-Time (RT-Delphi) Delphi, Trend Impact analysis (TIA), Mathematical Forecasting (simple regression and artificial neural networks), "What if" Simulation Analysis, Ontology Knowledge-base, Case-based Policy Analysis (CBPA) and "Why" Explanation,*** and integrating them with the enhanced strategic planning tools, which are: ***SWOT (Strengths, Weaknesses, Opportunities, and Threats), PESTEEL (Political, Economical, Socio-economical, Technological, Ethical, Environmental and Legal), Market (Competitors, Cooperators, Advantages and Limitations), Planning Bedrock Analysis(PBA) and Policy Formulation and Evaluation Analysis (PFEA)***.

The developed framework provides distributed interaction capabilities and helps in building, managing and sharing a knowledge repository that supports the quality of the strategic decision. Also, this repository is created from a large scale of participators (domain analysts, experts and policy/decision makers) and provides the formulation and evaluation of the future alternatives and policies, sharing visions for futures change and transferring the process of developing a decision from a one-man's show into a large scale asynchronous or synchronous participation process. In addition, it provides to utilize the data, modeling, explanation, visualization and report generation capabilities for shifting the focus from just extrapolating the trend of domain key variables to investigate all possible future values.

The developed framework consists of two major stages, which are: *the explorative futures scenarios* that provides a guidance for the major drivers of the future evolution and their possible future impacts. In additional, it increases the ability to adapt to surprises that are arising in the real environment. However, the second stage is the policy formulation and evaluation that provides a suggestive guidance, which is effective for recommending futures policies based on their expected impacts.

The previous stages provide policy/decision makers with extra time for better understanding of the futures threats and opportunities. Also, it provides alternatives policies evaluation to avoid threats and grasp the opportunities of the future, and create new opportunities by sharing vision for futures change with large scale participators. In addition, it enhances the participators memory and imaginations for alternative generation and evaluation.

Moreover, the developed framework has a set of alternative features, which are as follows: (1) a web-based collective DSS allow for transforming the process of developing a strategy from a one-man's show to a large scale asynchronous or synchronous participation process, (2) an intelligent and imaginer, which is based on utilizing internal and external data, modelling, knowledge based, explanation and the long view of the experts' imaginations capabilities, which is enhancing the explorative and normative power of the long-term strategic decision and (3) finally, the proposed framework is designed to be generic and thus it can be applied in different domain and aims.

There are two real case studies are applied to verify and validate the developed framework:

Case one: A DSS for long-term strategic planning of the Egyptian milk production.

It covers a research point in the research plan of the *Agriculture Research Centre (ARC)* in the *Egyptian Ministry of Agriculture (MOA)*. Its objective is to help the policy/decision makers, in the ministry of agriculture, to improve the quality of their long-term decisions, from 2008 to 2030, to reduce the national milk production gap (the difference between the national consumption and production).

In this case study, we developed a *mathematical forecasting* model, which is based on the *Simple Regressing (SR)* linear model with *a Mean Square Error (MSE= 17.75%)*. And by using the developed framework and analytical tool, the selected participators (policy/decision makers, experts and analysts) share to anticipate the futures, formulate and evaluate the satisfied policies to achieve the long-term national goals.

Case two: DSS for anticipating the impacts of future wildcards on the Egyptian tourism industry

This case-study is a part of the research project on *"Data mining for improving tourism revenue in Egypt"* within the *Egyptian Data mining and computer modelling centre of excellence*. This project represented a joint research effort between the *United Nations Development Programme-UNDP* and the *Ministry of Communications and Information Technology (MCIT)*. In this case study, policy/decision makers in the *Egyptian Ministry of Tourism (MOT)* needs to study how some wildcards would affect the number of tourists' arrivals in the future if they were said to occur. Policy/decision makers targeted to reach 20 million tourists' arrivals in 2020, the un-surprised free-forecast shows that the number of the tourists' arrivals expected to reach 18 million tourists in 2020 and 29 million in 2039.

The developed tool was used by the policy makers in *Ministry of Tourism (MOT)*. Now, it represents a major component for the *MOT* web portal, which contains data-warehousing and mathematical forecasting tools (generated from the other research sub-groups). In addition, we applied different presentations to policy makers *(Minister's deputies and advisors of both MOA and MOT)*. They give us desirability feedbacks for the ability to take the developed prototype as an important step to develop a long-term awareness system.

Contents

Abbreviations

Abbreviation	Description
• **AI**	Artificial intelligence
• **ANN**	Artificial neural networks
• **DBMS**	Database management system
• **CAT**	Consistency assessment technique
• **CMC**	Computer-mediated communications
• **DARPA**	Defense advanced research projects agency
• **DM**	Decision-maker
• **DSS**	Decision support system
• **EIS**	Executive information system
• **ESS**	Executive support system
• **ES**	Expert system
• **FS**	Futures studies
• **IDSS**	Intelligent decision support system
• **GDSS**	Group decision support system
• **KBM**	Knowledge-based model
• **LTSP**	Long term strategic planning
• **MSS**	Management support system
• **MA**	Moving average
• **MAM**	Morphological analysis method
• **MACTOR**	Matrix of alliances and conflicts: tactics, objectives, and recommendations
• **MBMS**	Model-base management system
• **MICMAC**	Impact matrix cross-reference multiplication applied to a classification
• **MBL**	Model-based language
• **NLP**	Natural language processing
• **OLAP**	On-line analytical processing
• **PESTEL**	Political, economical, socio-cultural, technological, ethical, environmental and legal
• **SWOT**	Strengths, weaknesses, opportunities and threats
• **ERT-Delphi**	Enhanced real time-Delphi
• **E-TIA**	Enhanced trend impact analysis