PRE-PROPOSAL

(The pre-proposal should be brief and should not be more than three pages, including this cover page)

Program	ADVANCED AND STRATEGIC TECHNOLOGIES			
Sub-Program/ Technology Area	1) Mathematics and Physics 2) Information Technology			
Track	1) Applied Mathematics 2) Scientific Computing			
Sub-Track	1) a) Econometrics; b) Statistics 2) a) Computer Simulation; b) Computer Modeling			
Project Title	**The Transportation Sector of Saudi Arabia: A Survey Based Analysis of Gasoline Consumption Behaviour and Model Based Econometric Forecast of Fossil Fuel Demand**			
Project Type	**Theoretical and Applied**			
Research Team	Senior Personnel			
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1. INTRODUCTION

Transportation is a key component of the service sector in every economy and indeed is the engine for economic development. This sector is heavily energy intensive and it largely relies on petroleum fuel products. Literature review on consumer (household, transportation sector, business entity) behaviour suggests that consumer responses to fuel economy issues and differences in fuel prices are more complex than economic assumptions suggest (Turrentine and Kurani, 2007). This is because consumer's demand for fossil fuel not only depend on its own price, but also on the price of other complementary (like automobile, power generators) as well substitute (like alternative energy sources such as coal and solar energy) products. Furthermore, consumer taste, macroeconomic trends and international situations could also have important impacts on the trend in fuel consumption for any country. Saudi Arabia is no exception in this regard. Yet, a search in the extant literature appears to indicate that there is no extensive study on consumer behaviour when it comes to fuel consumption in Saudi Arabia. In Saudi Arabia, the transportation sector almost entirely relies on the supply of fossil based fuel products. Furthermore, the use of alternative energies in the automotive industry is still in its early stages or at pilot scales. The sector, therefore, will remain utterly dependent on petroleum products for a foreseeable future – at least for the next ten years or so. Therefore, understanding the behaviour of energy demand in the transportation sector would not only equip the energy supply sector (i.e., Saudi Aramco) to meet the sector's demand in a timely manner, but will also provide a smooth economic development for the economy as a whole.

The objectives of the present study, the first of its kind for Saudi Arabia, are essentially twofold: (i) analysis of gasoline consumption behavior, namely consumption of PG91 and PG95; and (ii) demand forecast for various petroleum products that are used by the transportation sector, by sub-sectors, fuel-type, and geographical location for the next 10 years. Apart from assisting Saudi Aramco in forecasting energy demand and improving marketing strategy and initiatives, the present study is expected to contribute to two priority areas of the strategic technologies outlined in the current NSTIP guideline. First, it would contribute to strategic area of mathematics and physics by undertaking an econometric and statistical exercise under the applied mathematics track. The present study will develop a conceptual mathematical economic model and identify various measurement scales. The analysis of survey based consumer behavior of the transportation sector would also result in a large database which could be transferrable for future development of more sophisticated mathematical and statistical models pertaining to the energy sector of Saudi Arabia. Second, it would contribute to the strategic area of information technology by undertaking sophisticated computer based econometric estimation of the conceptualized model and by generating econometric forecast based on computer-based simulations.

2. PROJECT OBJECTIVES

The broad objectives of the present study essentially are two fold:

1. To analyze gasoline consumption behavior with special focus on consumers' decision-making process regarding the choice between car fuel types PG91 and PG95.
2. To estimate the demand for various petroleum products that are used by the transportation sector and forecasting that demand for the next ten years.

The consumer behavior study will undertake an analysis of consumption behavior with focus on consumer's decision-making process in the selection between fuel (gasoline) types PG91 and PG95. Specific objectives of this component are as follows: a) reviewing the literature on consumer decision-making/choice; b) conducting an exploratory qualitative research through the use of focus groups and/or in-depth interviews to identify factors influencing consumer selection between PG91 and PG95; c) Conducting a survey to verify the factors influencing consumer selection between PG91 and PG95; d) Recommending a set of strategies based on the findings.

The economic forecast study will focus on an analysis of demand estimation and forecast. Literature reveals that there are a wide range of approaches and techniques for estimating and forecasting energy demand in the transportation sector. The various approaches will be studied, aiming to then apply whatever seems most appropriate for this study. Specific objectives of this component are as follows: a) reviewing the literature on the transportation sector; b) analyzing energy demand of the sector on the basis of available data; c) Identifying major demand drivers and players in the transportation sector; d) constructing an empirical model for energy demand for the transport sector; e) forecasting energy demand by the transportation sector for the next ten years.

3. BRIEF DESCRIPTION OF THE PROPOSED WORK AND EXPECTED OUTCOMES

The proposed research under the present study would be carried out by dividing it into ten phases or tasks. They are as follows:

Task I: Literature Review

Literature relevant to both areas of the study – the consumer behaviour regarding gasoline grades PG91 and PG95, and macro economic forecasting of energy fuel (petroleum products) demand will be updated and analyzed.

Task II: Consumer Behaviour Study-Questionnaire Design, Pre-Testing and Sampling Plan

This task will be carried out by performing several sub-tasks:

Sub Task II. A: Exploratory Study-Personal Interviews and Focus Group Sessions:

An exploratory study using personal interviews and focus group sessions will be conducted to identify additional Saudi-specific factors to be included in the measurement scales.

Sub Task II. B: Questionnaire Design and Pre-Testing:

The constructs identified through literature review as well as inputs from the exploratory study will be used to design a structured self-administered questionnaire and will be pre-tested.

Sub Task II. C: Establishing a Sampling Plan:

A reasonable sample size would be determined and a convenient sampling procedure will be adopted.

Task III: Consumer Behaviour Study: Sampling and Data Collection

The process of data collection will involve the use of field resources. Graduate and under-graduate students will be recruited during the process.

Task IV: Economics Survey and Data Collection

This task will develop and conduct a comprehensive survey (not a census) on the transportation sector, including all its sub-sectors. In addition to the survey, this study will develop a comprehensive data set both from primary and secondary sources.

Task V: Economic Descriptive Analysis of Energy Demand of the Transportation Sector

This task will conduct a detailed analysis of the competitive landscape for fuel demand, including gasoline PG91, PG95, and diesel, within the transportation sub-sectors on the basis of historical data.

Task VI: Identification of Major Demand Drivers in the Transportation Sector

This task will identify major variables that are driving the fuel consumption demand in the sector.

Task VII: Analysis of Gasoline Consumption Behaviour

This task will use specific statistical techniques (both bi-variate and multi-variate) to generate necessary descriptive statistics for the sample.

Task VIII: Model Construction and Estimation

In this task, on the basis of historical data, a set of mathematical models would be developed, their counterpart empirical models will be constructed and finally, estimation of the empirical models would be carried out by using a variety of techniques, from simple regression analysis to more sophisticated time-series approaches, or non-parametric optimization techniques.

Task IX: Forecasting

On the basis of the previous tasks, this study will provide some robust forecasts for the quantity demanded of all types of petroleum fuel products that are consumed in transportation sector of Saudi Arabia for the next ten (10) years. All available and applicable sophisticated time-series techniques would be used.

Task X: Report Writing and Presentation

The two interim progress reports and one draft of the final report are considered as key components of this task.

4.   VALUE TO THE KINGDOM

In recent years, there has been a remarkable surge in the domestic consumption of gasoline in Saudi Arabia. Furthermore, without deeply understanding the landscape for the current and future demand for fossil fuel, a realistic search for an alternative viable energy source has still remained in its infancy. The present study could derive scientific evidence that could change the current mind set of the policy makes and the private entrepreneurs. As a result, everyone from the policy makers, private sectors, concerned citizens, students and most importantly, applied researchers in the field of statistics, economics and other business discipline should benefit from this research. Second, the present study would provide vital information to Aramco by providing a more transparent picture of the current trend in domestic demand for gasoline. Third, the outcome of the project should clearly help the government of Saudi Arabia to identify strategic sectors in its development plan that might play key roles in Saudi Arabia's economic development in years to come. Fourth, the private sector might also benefit from this research because it might identify key areas where private sector investment might be warranted and efficient. Finally, the project will apply and utilize several recently developed statistical tools and modelling techniques. Therefore, this research is also expected to benefit researchers not only in economics and business but also students and researchers in other fields of applied mathematics and statistics. This should also provide general help to students in studying applied mathematics and statistics in college and beyond.

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