

# Using Logarithmic Goal Programming Methodology to develop a utility function for buyers of health insurance in India

**Keywords:** Multi – Criteria Decision Making, Logarithmic Goal Programming, Health Insurance, utility functions

## Abstract

### Introduction

The liberalization of Indian insurance sector has promoted a large number of international insurance companies to enter the India. These companies mainly cater to the life insurance market in India. Yet insurance penetration has been low with the premium on all current insurance policies in India being 2% of GDP (CYGNUS; 2007) – this is very low compared to most developed economies. But, the heartening news is that the insurance sector is growing at 15% annually.

Most of the premium collected and the growth mentioned above is with respect to life insurance policies; though a small proportion does go towards health insurance as well. However, as is well known, health related services in India are getting expensive by the day. Further, the per capita income in India is rising, especially with the growing middle class. Coupled with this is the fact that at present only 10% of the population is covered by the health insurance market (CYGNUS; 2007). All this indicate that the market has a great potential rising on the back of rising health service costs as well as increased awareness of being healthy as well as increased affordability. It might be interesting to note that the Indian health insurance sector was worth INR 51.25 billion in 2008 with a compounded annual growth rate of 31% between 2002 and 2008 (Santosh; 2009). Incidentally, the health insurance sector is amongst the fastest growing sectors in non – life insurance in India. In this backdrop, most of the insurance companies are very keen to enter the health insurance market. While a number of companies have entered the Indian market – as of date about 11 companies offer health insurance

products in India, Life Insurance Corporation of India (LIC) still controls about 90% of the business in India.

But what are the attributes of these products that would drive the health insurance market in India.

## **Objective of the study**

The objective of this project is to formulate a mathematical model which can describe the utility of a health insurance product for the buyer. Based on the descriptive and quantitative preference of the buyers the insurers can bridge the gap of existing portfolio of insurance products and the desired optimal products. In general, we will use gathered data to find the optimal preferences coefficients of the identified attributes of health insurance product in Indian markets.

In this paper we try to develop a ready reckoner to match the buyers' requirement with the products that the insurance companies can offer and more importantly focus on how important these factors are when compared amongst themselves. This will aid the policy holders and potential investors in comparing the various policies being offered. In particular, the paper tries to look at the following things:

1. The main attributes that a policy holder looks at in terms of a product. This is important given the plethora of health insurance products that are available in the Indian market with each of these products having different qualities as well as offering different returns.
2. Following on, once the main attributes have been identified, we would try to create a hierarchy of these attributes in terms of their relative importance to the policy holder.

The main issue would be the development of a utility function for Health insurance market in India. One approach to do it would be by applying the multi criterion decision making approach and Logarithmic goal programming method similar to the one used by Dutta; Basu and John (2008). It is expected that this exercise will result in the development of a linear utility model to obtain some answers for the questions raised above.

## Proposed Methodology

The proposed methodology is mixed – it addresses some theoretical issues and then looks at empirical market data to validate the same. In particular, the proposed approach for the study is going to be based on Multi Criterion Decision-making Approach (MCDA) and Logarithmic Goal Programming Method (LGPM). Using these techniques, a linear utility model will be developed to answer the following questions:

- a. The attributes of the product that a policy holder is looking for
- b. Given these attributes, the relative weights of various attributes
- c. Compare the existing insurance products based on the framework developed
- d. Probabilities of selecting a product from a set of mutually exclusive alternatives

While a lot of work has been done on the use of various different mathematical techniques to develop utility functions, not much work has been done towards developing a utility model for health insurance products; particularly in the Indian context. Hence development of a utility function is very important in the Indian context. This paper is also possibly one of the first attempts to develop a utility model of health insurance products using LGPM. Further, the belief is that this work will help the buyer of a health insurance product to compare the existing products in terms of the different attributes important to the buyer thereby making a better-informed buying decision in terms of the numerous products available in the market.

The paper is expected to cover the following:

- Importance of insurance as a financial product in an emerging market.
- Relevant literature survey
- Description of the proposed model
- Description of the logarithmic goal programming model and its computer implementation methodology
- Discussion of the results of the model and tabulation of the different products in the market

In this paper, as an illustration of the model developed in the paper, a survey of a few health insurance policies available in the Indian market shall be made – this also allows for testing the

model. The survey results that would be shown are only for the health insurance policies available in India, but can be easily extended to other types of policies (non – life policies) and other markets as well.

## Expected Outcome

The expected conclusions of the work are as follows:

- Development of a linear utility function framework that can compare and rank the health insurance policies currently available in the market
- Make it possible to identify the (relative) key parameters and design insurance policies accordingly.

## References

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