LINEAR PROGRAMMING MODEL APPLICATION IN BUSINESS ENTITIES

M MARY SANUJA[*]

ABSTRACT

Success depends upon the strategies which the company is using. Linear programming is an important branch of operational research and it is a mathematical method to assist the people to carry out scientific management. GAMS is an advanced simulation and optimization modelling language and it will combine a large number of complex mathematical programming, such as linear programming LP, nonlinear programming NLP, MIP and other mixed-integer programming with the system simulation. This paper show how people can run a successful businesses whether as an individual or as a group without any stress. The work study is of complete information on how an entrepreneur can start a business by putting the necessary strategies to optimize the business. This study is based on a survey of some few selected companies in Chipata and how the y have managed to run a successful business with little or no difficult.

KEYWORDS: Linear Programming, Nonlinear Programming, Mixed-Integer Programming.

INTRODUCTION

The improvement of linear programming problem has been positioned among the most critical logical advances in the present age. Today is the tool that has saved many thousands or millions of money for most organizations of even direct size in the different industrialized countries. Zambia being a developing country, various companies and industries have adopted the use of L.P.P in businesses. The progresses of the business depend upon the way L.P.P has been used or applied (i.e. the way they have maximized or minimized) in their business. This focuses on how they can achieve the goals that has been set by the company. This gives an idea to people on how they can develop in their respectively places where L.P.P is being applied. Information attached to an uncertainty can be categorized into different interpretations. The interpretations of uncertainty information associated with this thesis are probability, belief, plausibility, necessity, possibility, random set, and probability interval, probability on sets, cloud, and interval-valued probability measure (IVPM).

Quite to the contrary, models can be developed inside the present condition of accessible information and they can be utilized to assess regardless of whether it is economically desirable to assemble extra information.

[*]Assistant Lecturer, DMI St Eugene University, Chipata, Zambia.
Correspondence E-mail Id: editor@eurekajournals.com

OBJECTIVES OF STUDY

The following are the main aim of studying L.P.P in business setup:

- To develop our mother country Zambia.
- To sustain the economy.

IMPORTANCE OF LINEAR PROGRAMMING PROBLEM COMMERCIAL INSTITUTIONS

The commercial institutions as well as the individual traders are also using Linear Programming techniques for cost reduction and profit maximization. The oil refineries are using this technique for making effective and optimal blending or mixing decisions and for the improvement of finished products

In a linear program, the objective function and the requirements are linear relationships, implying that the impact of changing a decision variable is relative to its magnitude. While this prerequisite may appear to be excessively prohibitive, many real-world business issues can be formulated in this way. That gives an intense and robust analytical methodology for supporting fact-based decision making.

REVIEW OF LITERATURE

The seeds of linear programming were sown amid World War II when the military supplies and staff must be moved effectively. Albeit linear programming problems can be extremely confused, which is not out of the ordinary since they are genuine problems, the standards can be understood by beginning with basic problems that can be tackled with GCSE variable based math. Two dimensional linear programming can be fathomed graphically. Problems with in excess of two factors (similar to the case for most true problems) can be tackled by utilizing a procedure called the simplex technique (Wood and Dantzig 1949, Dantzig 1949). The Simplex algorithm was one of the main Mathematical Programming

algorithms to be created and it gives an intense computational tool, ready to give quick answers for huge scale applications, now and then including a huge number of factors (i.e. decision factors). Its consequent fruitful implementation in a progression of uses altogether added to the acknowledgment of the more extensive field of Operational Research as a scientific approach to decision making. Linear improvement is the issue of expanding a linear capacity over a raised polyhedron.

Linear programming is presently utilized widely in business, financial matters and building. A case of a building application would boost benefit in a factory that fabricates various diverse items from a similar crude material utilizing similar assets.

OBJECTIVES OF THE RESEARCH

- **SCIENTIFIC APPROACH TO PROBLEM SOLVING**: Linear Programming is the use of scientific approach to problem solving. Thus it brings about a superior and genuine picture of the problems-which would then be able to be minutely analysed and solutions ascertained.
- **EVALUATION OF ALL POSSIBLE ALTERNATIVES**: The majority of the problems faced by the present organisations are highly complicated-which can't be tackled by the customary approach to decision making. The approach of Linear Programming guarantees that'll conceivable arrangements are generated-out of which the optimal solution can be selected.
- **HELPS IN RE-EVALUATION**: Linear Programming can also be utilized as a part of re-assessment of an essential plan for changing conditions. Should the conditions change while the arrangement is done just mostly, these conditions can be precisely decided with the assistance of Linear Programming so as to adjust the remainder of the plan for best results.

RESEARCH DESIGN

Questionnaires, interviews and observation were used for collecting of data and Microsoft word for analysing of the data. By using these, the L.P.P problem is clarified on how to be optimized in business.

UNIVERSAL

The entire world today, has been become a global village and is affected generally to some selected countries such as Zambia, Malawi, only to mention a few who are not familiar with the use of L.P.P in a business setup.

SAMPLING AREAS

ZESCO limited company, water and Sewage Company, Shoprite, Kavulamungu, Airtel, Choppies and spur shopping mall are one of the biggest companies which are found in eastern province. For this reason, the research was done within these companies. During the research, individual customers and owners of the companies were used for collecting of data by interviewing them. Due to this, Chipata city and chadiza was our sampling area of study.

DATA COLLECTION PROCEDURE

The research used one questionnaire, for one manager when collecting data. The questionnaires were administered to the managers in various companies with the help of workers.

ANALYSIS OF DATA

Data collected was analysed in one way which was qualitative data. Qualitative data from the questionnaire and group discussion were analysed by categorizing, describing and explaining. Therefore through qualitative, the analysis of data was successfully analysed.

RESULTS OF MANGERS RESPONSES ON INTEREST IN LINEAR PROGRAMMING PROBLEM

Table 1.Managers interest

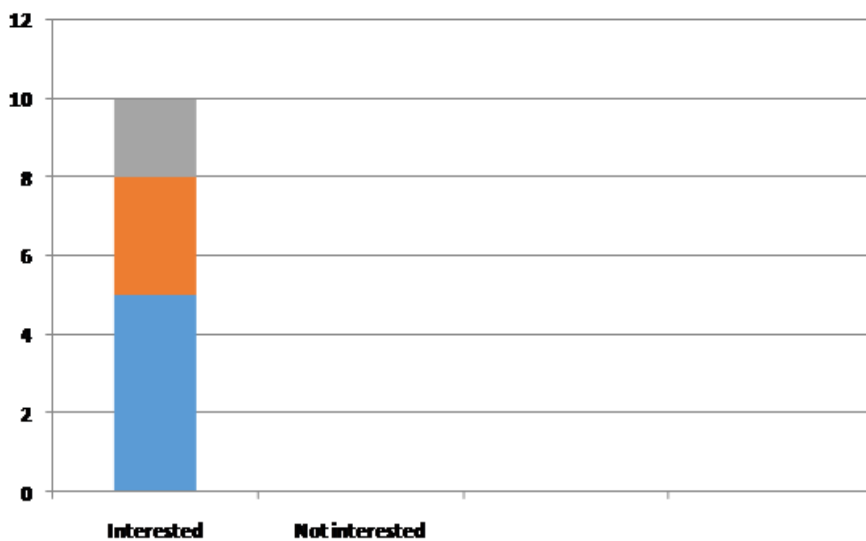| Name of company	Interested	Not Interested
Airtel Zambia	3	0
ZESCO	1	0
NAPSA	2	0
WSCL	1	0
Choppies	5	0
Spur	2	0
Total	14	0

Figure 1.0 Comparison on Managers interest in general

There were about 10 Managers with 100% and who didn't have interest were at 0%. For all three companies as shown in figure 1.

RESPONSES OF MANAGERS ON ATTITUDE TOWARD LINEAR PROGRAMMING PROBLEM

The figure 2 shows the manager's responses from the questionnaire questions on the attitudes of managers towards the effect and causes of linear programming problem in business set up. The figure shows those managers with negative attitudes and positive attitudes towards linear programming problem.

Table 2.Managers Attitudes

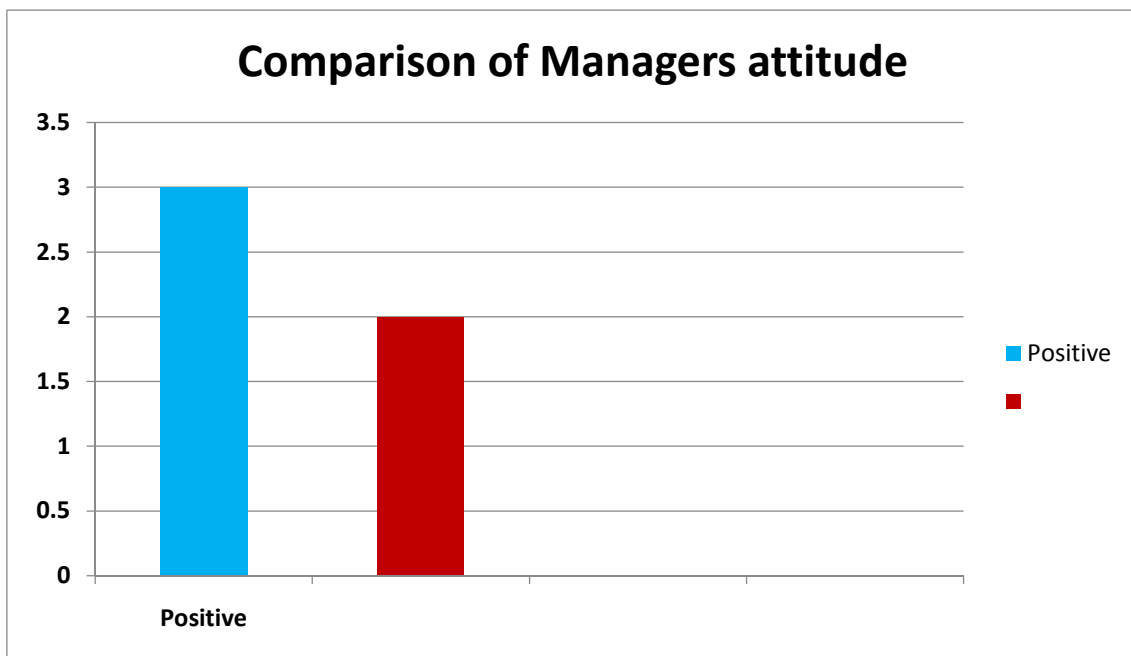| Name of company	Negative	Positive
Airtel Zambia	2	3
ZESCO	0	4
NAPSA	0	4
WSCL	1	3
Choppies	1	2
Spur	1	1
Total	5	17

Figure 2.Comparison of Managers attitude

The comparison of managers was favourable in the sense that more than 50% showed positive attitude towards the aim of the research as compared to those with negative towards the research. This shows that managers have more positive attitudes towards on how are the effects and causes of L.P.P in a business set up.

ATTITUDES OF CUSTOMERS WHEN BUYING GOODS

The responses of customers when buying goods was observed that they feel comfortable to get goods on their own during shopping. The pictures below show customers purchasing their goods.

The following information shows some of the merchandize which people usually need in their daily life situations which are sold in spur. According to the comparison of the three manager's responses of the questionnaire towards the effects of the environment to the business, it was found that for every successful business should be located where there is favourable climate. This means that the location should be where there is no pollution and other hazardous things.

USING LPP TO SELECT TENANTS IN BUSINESS BUILDINGS

Linear programming problem also gave us the opportunity on how we analysed the data corrected in the ministry of local government. Below is one of the examples on how linear programming can be applied in some selected tenants in business buildings.

EXAMPLE NAPSA BUILDING

NAPSA building is one of the largest in chipata city which was specifically built for business. NAPSA director produces a tentative floor plan, or "footprint," for the building. This plan outlines sizes, shapes, and spaces for large department stores. The tenant mix describes the desired stores in the building by their size, general location, and type of merchandise or service provided. For example, the mix might specify two small jewellery stores in a central section of the building and a medium-size shoe store and a large restaurant in one of the side aisles. In the past, NAPSA developed a plan for tenant mix using "rules of thumb" developed over years of experience in building development. Now, to improve its bottom line in an increasingly competitive marketplace, NAPSA treats the tenant-mix problem as an LP model. First, the model assumes that tenants can be classified into categories according to the type of merchandise or service they provide. Second, the model assumes that for each store type, store sizes can be estimated by distinct category. For example, a small jewellery store is said to contain about 700 square feet and a large one about 2,200 square feet. The tenant-mix model is a powerful tool for enhancing NAPSA's building planning and leasing activities.

The flowing diagram shows on how business buildings are being distributed to tenants and how they pay according to the size of the room.
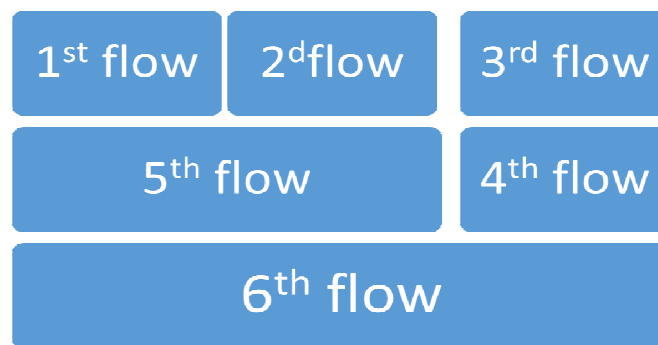

Figure 3.The figure above show NAPSA building

Diagram above shows rooms for business purpose.

APPLICATION OF L.P.P IN SHOPPING MALLS

Basically shopping Malls has been providing all house hold necessities including different variety of foods. Despite providing all these things, the main aim of these shopping malls is to optimise their businesses as well as providing sustainable to the country from the profits they make. According to the research which we carried out, all shopping malls have a great positive attitude toward the use of L.P.P in business. The findings from the questionnaires shows that all the shopping malls which we visited, they have being using L.P.P and it has been a corner stone to outstand their businesses due to its value and role in which it play in business especially in short terms policies. The following example shows on how L.P.P is being used when optimizing the business according to the research of the project.

CONCLUSION

The over view between managers showed that the nature of the business should consider the population, environment and communication so

that the optimization of the business can be of highest level. It shows on how contractors can invest their money in the industry of construction through the use of linear programming without encountering any loss. The findings has attempted to offer some practical strategies to help business men and women to deliver Linear Programming, taking account of the wide range of mathematical ability, confidence and attainment which companies has to undertake to manage their businesses. A key to successful delivery is we looked to build the linear programming problem in simple and discrete stages.

REFERENCES

[1]. Borasi, R. (1990). The invisible hand operating on mathematics instruction: Students´ conceptions and expectations. Reston: NCTM. Brown, D. (2006).

[2]. Begley, S. "Did You Hear About the Salesman Who Travelled Better." *OR/MS Today* 31 (January 2004): 20.

[3]. Brown, G., et al. "The Kellogg Company Optimizes Production, Inventory, and Distribution." *Interfaces* 31 (November-December 2001): 1-15.

[4]. R. Banuelos. Measure Theory and Probability. Department of Mathematics, Purdue University, 2003. Lecture notes.

[5]. J. R. Brige and F. Louveaux. Introduction to Stochastic Programming. Springer, 1997

[6]. K.D. Jamison and W. A. Lodwick. The construction of consistent possibility and necessity measures. Fuzzy Set and Systems, 132:1-10, 2002.

[7]. T. Morrison and H. J. Greenberg. Robust optimization. In A. R. Ravindran, editor, Operations Research and Management Science Handbook, The Operations Research Series, chapter 14. CRC Press, Boca Raton, FL, 2008.

[8]. Hung T. Nguyen. An Introduction to Random Sets. Chapman & Hall/CRC, Boca Raton, FL, 2006.

[9]. P. Walley. Statistical Reasoning with Imprecise Probabilities. Chapman &Hall, London, 1991.

[10]. Z. Wang and G. J. Klir. Fuzzy Measure Theory. Plenum Press, New York, 1992.

[11]. H. Zimmermann. Description and optimization of fuzzy systems. Internet J. Gen. Systems, (2):209-215, 1976.