MARKETING EFFECTIVENESS IMPROVEMENT ANALYSIS BASED ON SYSTEM DYNAMICS MODEL

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ABSTRACT

Marketing activities always have been thought to be crucial in the present life and the future survival of the companies and sometimes impose greatest cost on them. Therefore, the investigation upon measuring the effectiveness of these activities is an inevitable fact. Regarding the constant and complex relationships between each of the measures that affect marketing effectiveness, a methodology of evaluating that cannot cope with these sophisticated interactions would not be useful. This paper primarily attempts to establish a system dynamic model of marketing effectiveness that could explain the interactions between factors which influence marketing effectiveness by causal loop diagram and then, presets several executable scenarios to improve marketing effectiveness. The metrics that have been investigated in this Study are totally applicative and comprehensive which can evaluate marketing effectiveness in various industries. The metrics of the research were generated from 75 marketing executives in the industrial units of East Azerbaijan, one of the most important industrial zones in terms of the number of manufacturing companies in Iran, and an expert panel as well. Results of this study clarify that applying intensive strategies and improving relationships with customers would lead to optimize marketing effectiveness of a company.

KEYWORDS

Marketing effectiveness, System dynamics, Causal loop diagram, Flow diagram, Simulation

INTRODUCTION

The purpose of marketing effectiveness is to optimize marketing spend for the short and long term in support of, and in alignment with, the brand strategy by building a market model using valid and objective marketing metrics and analytics (Powell, 2008). Marketing effectiveness calls for managers to have sufficient information for the purposes of planning and effective resource allocated to varying markets, products and territories. Marketing effectiveness is also contingent upon the adeptness of managers to deliver profitable strategies from its philosophy, organization and information resources. Ultimately, marketing effectiveness depends upon the

ability to implement marketing plans successfully at various levels of the organization (Adu *et al*, 2001).

In spite of the importance of business performance unfortunately, there are not adequate researches on metrics used to evaluating marketing effectiveness. First, the complexity of unraveling marketing short term from long term effects and second, the existence of numerous components that reflect parts of marketing performance are reasons for the lack of an efficient model for measuring the effectiveness of marketing. Difficulties in measuring qualitative Metrics are another reasons for manager`s weak tendency in using different models of evaluating marketing effectiveness. Given that marketing play major role in company's survival and sometimes impose greatest cost on them, it makes a fundamental contribution to long term business success. Therefore, marketing effectiveness and marketing audits are two famous metrics for monitoring marketing controlling variables (kotler *et al*, 2006*)*. Although we should consider that marketing effectiveness is not so simple, good results may be due to a division`s being in the right place at the right time rather than the consequence of effective management (kotler, 1977).

Research of marketing effectiveness could be divided into two major viewpoints. In the first viewpoint, scholars consider the concept of marketing effectiveness and try to determine its components. This view was among the first consider by Philip Kotler (1977). He mentioned that the marketing effectiveness of a company, division, or product line depends largely on combination of five activities: Customer philosophy, Integrated marketing organization, Adequate marketing information, Strategic orientation and Operational efficiency. The first view consists many researches in which some scholars examine impacts of various factors on marketing effectiveness (Dunn *et al*, 1994; Webster, 1995 and Nwokah and Ahiauzu, 2008, 2009). Also Some others have investigated Kotler`s (1977) an amalgam of five components notably Table 1 in a certain country or industry (Yoon and Kim, 1999; Cizmar and Weber, 2000 and Adu et al, 2001).

However in the second view, scholars consider the marketing effectiveness metrics and examine its measures. This view most studies evaluating and measuring marketing performance. Importance of the view is owing to the reason that Marketing Science Institute made Accountability and ROI of marketing expenditures as one of its research priorities since 2000. Researches classified in this view attempt to identify and represent various measures and metrics of evaluating marketing effectiveness. Clark (1999) identifies about 20 measures in which Ambler and Riley (2000) tested a total of 38 measures and Davidson (1999) considers ten important measures of marketing effectiveness and Meyer (1998) notes hundreds. Barwise and Farley (2004) examine six metrics in five industrial counties. However, Clark (1999) suggests we should make better use of existing measures rather than formulate new ones.

Due to the importance of defining exact metrics for evaluating marketing effectiveness a research had been carried out by Faridyahyaie (2012) within the industrial units of one of the

most industrial zones of Iran by the name of East Azerbaijan. The research proposes six main measures that commonly used among them. The measures are as follow: Market share, Marketing Profitability, Sale growth, Customer number, Customer satisfaction and Costumer loyalty. Subsequently the study provides the weight of each measure by using Factor Analyze and presenting the follow equation:

Marketing Effectiveness= W_1×Market Share + W_2×Marketing Profitability + W_3×Sale Growth + W_4×Customer Number + W_5×Customer Satisfaction + W_6×Customer Loyalty

Whereas W_1 = 0.845, W_2= 0.735, W_3= 0.709, W_4= 0.587, W_5= 0.558 and, W_6= 0.437

All of the above measures are assessing by various metrics as well (Figure 1).

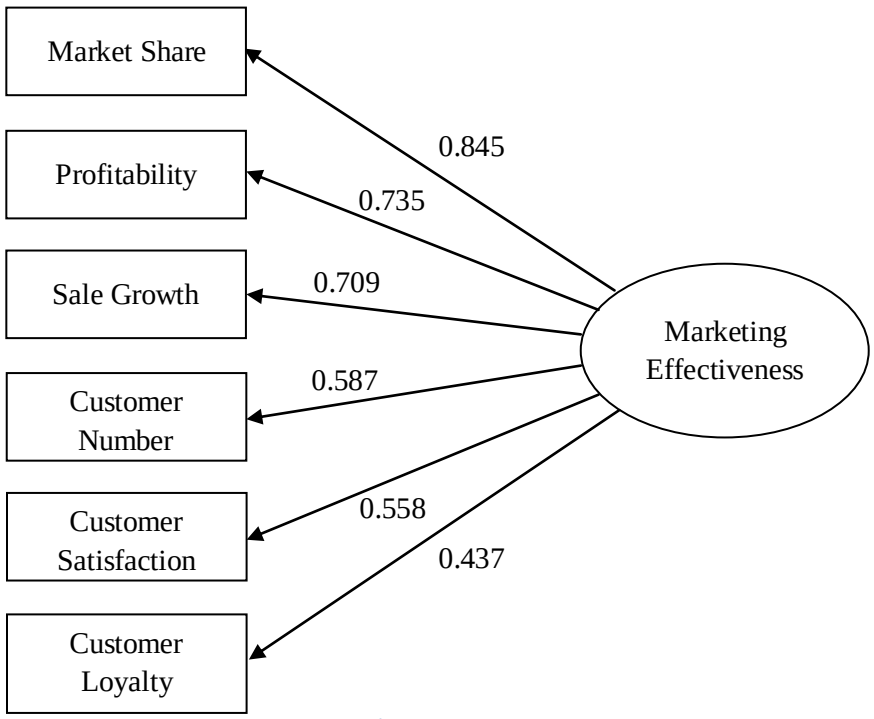

Figure 1

Regarding the constant and complex relationships between each of the measures which affected the marketing effectiveness, a methodology that cannot cope with these complex interactions would not be useful. Regrettably, most of the researches in the field of marketing effectiveness are based on statistical methods which are atomistic and static while due to the complexity of the interactions between marketing systems we need to apply methods that are holistic and dynamic. Hence the urgent need for change in the formulation and analysis techniques of the effectiveness of the marketing system is felt. This method should not only focus on the analysis of the system itself but also it must take into account the relationships among metrics. The best technique that had been presented up to now to cover these kinds of

complexities is Systems thinking and particularly System Dynamics (SD) methodology. SD methodology provides tools to incorporate the interactions between relevant factors of marketing system. SD uses causal loop diagrams to explain how different factors could affect a system and how they interact with each other. Also SD method could simulate the system's behaviors in future and provide this opportunity to evaluate the effects of modifying one or several factors on system in the future. By using this facility of SD we could present several scenarios to improve the system.

The main purpose of this study is to demonstrate relations between factors that influence Marketing Effectiveness dynamically with causal loop diagram and to present several scenarios to improve it by SD simulation.

MODELING

System dynamics (SD) explains and models the problem based on the casual structure of the feedback loops in the system. Also it could simulate the system to present some scenarios which can be implemented in reality. Because of various reasons SD methodology was selected in this research in order to study the Marketing Effectiveness. Firstly, Marketing Effectiveness is better to be studied in a long-term perspective. Secondly, Marketing Effectiveness is influenced by many factors with dynamic and feedback features. System dynamics applies feedback loops to investigate problems dynamically which can compensate the defects of static models which might end up at local optimization, not global optimization.

By considering Faridyahayaie's M.Sc. thesis, literature review, as well as expert panel's opinion, all factors which can contribute in the causal loop diagram have been identified. In the thesis a questionnaire has been filled out by 75 commercial managers of great manufactures in East Azerbaijan province, Iran. The questionnaire included all the factors that had been supposed to be important in calculating the Marketing Effectiveness and the commercial managers highlighted the most significant ones.

CAUSAL AND FEEDBACK LOOP

As stated above, all important factors in causal loop and the relations between them have been identified considering the Faridyahyaie's M.Sc. thesis, literature review and expert panel's ideas. Causal loop in surveying Marketing Effectiveness starts with two loops: a Balance loop and a Reinforcement Loop. Figure 2 shows all the factors which involving the indicated loops, how they are connected to each other and how they affect the Marketing Effectiveness.

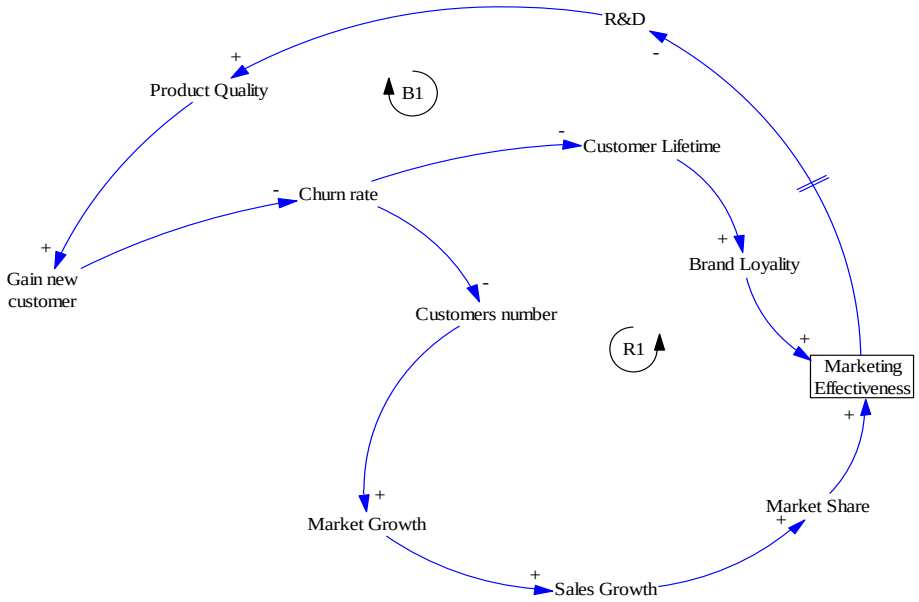

Figure 1

Most of the important factors in evaluating Marketing Effectiveness are involved in these Balance and Reinforcement loops. According to the thesis, Marketing Effectiveness could be measured by Sale Growth, Market share, Customer Number, Customer Satisfaction, Customer Loyalty, and Marketing Profitability. These two loops include factors related to Customer Number, Market share, Sale Growth, and Customer Loyalty.

The last two parameters in measuring Marketing Effectiveness, which have been entered in the causal diagram, are Customer Satisfaction and Marketing Profitability. Figure 3 shows final causal diagram which has 5 Reinforcement Loops and 4 Balance Loops. There are two delay relation in this model; the first one describes the impact of Marketing Effectiveness on R&D. Our findings from literature review and our expert panel team demonstrate that after improvement of Marketing Effectiveness to desired level our investment in R&D will reduce because we could reach to our goal so it has negative relation in long term on R&D. The second delay relation is related to effect of market share on profit in long term. The market share increases have come at cost in long term because the new customers are not profitable and we spend more cost to gain new customer than customer retention thus increasing of market share would increase companies' costs and it would reduce companies' profit.

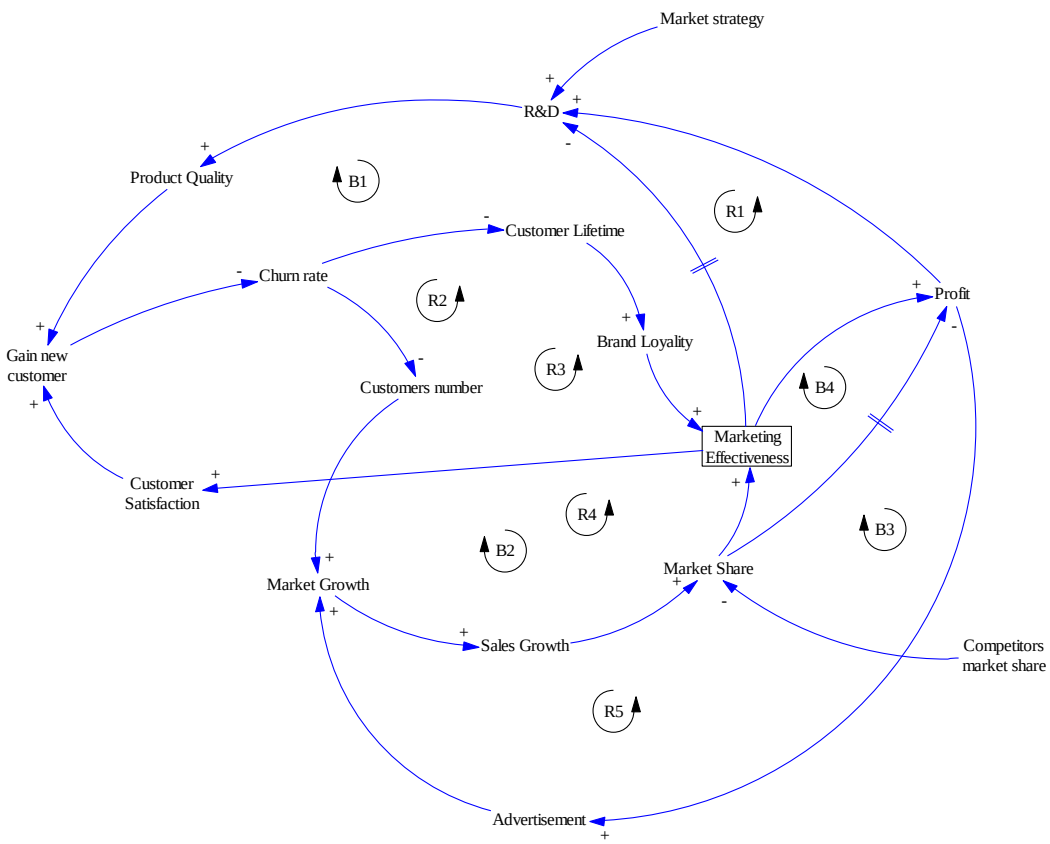

Figure 2

FLOW DIAGRAM

Based on introduced causal loop diagram, stock and flow diagram has been presented in three parts:

A. Customer Loyalty and Satisfaction

This part describes the changes in Customer Loyalty and Satisfaction and how they affect Marketing Effectiveness during the simulation time.

For using Marketing Effectiveness formula all of the six major factors that influence Marketing Effectiveness, pointed in introduction, have to be between 0 and 1. In order to this purpose, *"Max of Customer Satisfaction"* should be considered as a fraction for Customer Satisfaction. Bear in mind that the Customer Loyalty is a number between 0 and 1 automatically, so there is no need to have a fraction. As shown in figure 4, Customer Loyalty increases by Regular Customers Increase Rate and decreases by Regular Customers Decrease Rate. Also the Customer Satisfaction grows by Customer Satisfactory rate variable and declines by Customers Dissatisfactory rate which is affected by a constant variable named Defect Rate. For example,

not only a company cannot gain new customers if it cannot establish a Customer Relationship Management (CRM), but also this may leads to decrease in its previous customers as well.

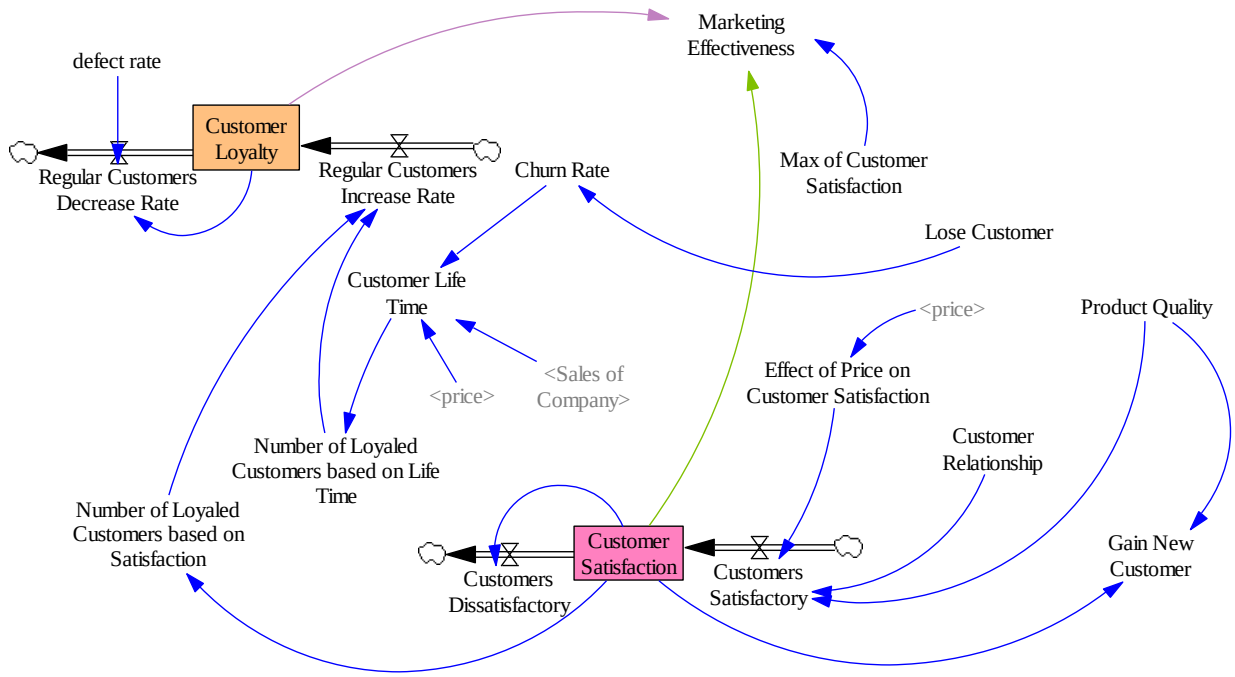

Figure 3

B. *Customer Number and Marketing Profitability*

In this part, the changes in Marketing Profitability and Customer Number have been considered as stock variables. Also, this part of the Flow diagram shows how they affect Marketing Effectiveness. Given that the Marketing Effectiveness would increase Marketing Income, it should be linked to the Income variable by "Effect of Marketing Effectiveness on Income" variable.

As shown in Figure 5, all marketing costs have been involved in the model, because they are so important in measuring Marketing Profitability and Marketing Effectiveness directly. In order to convert value of Customer Number and Marketing Profitability to a number between 0 and 1, *"Max of Marketing Profitability"* and *"Max of Customer Number"* have been linked to Marketing Effectiveness.

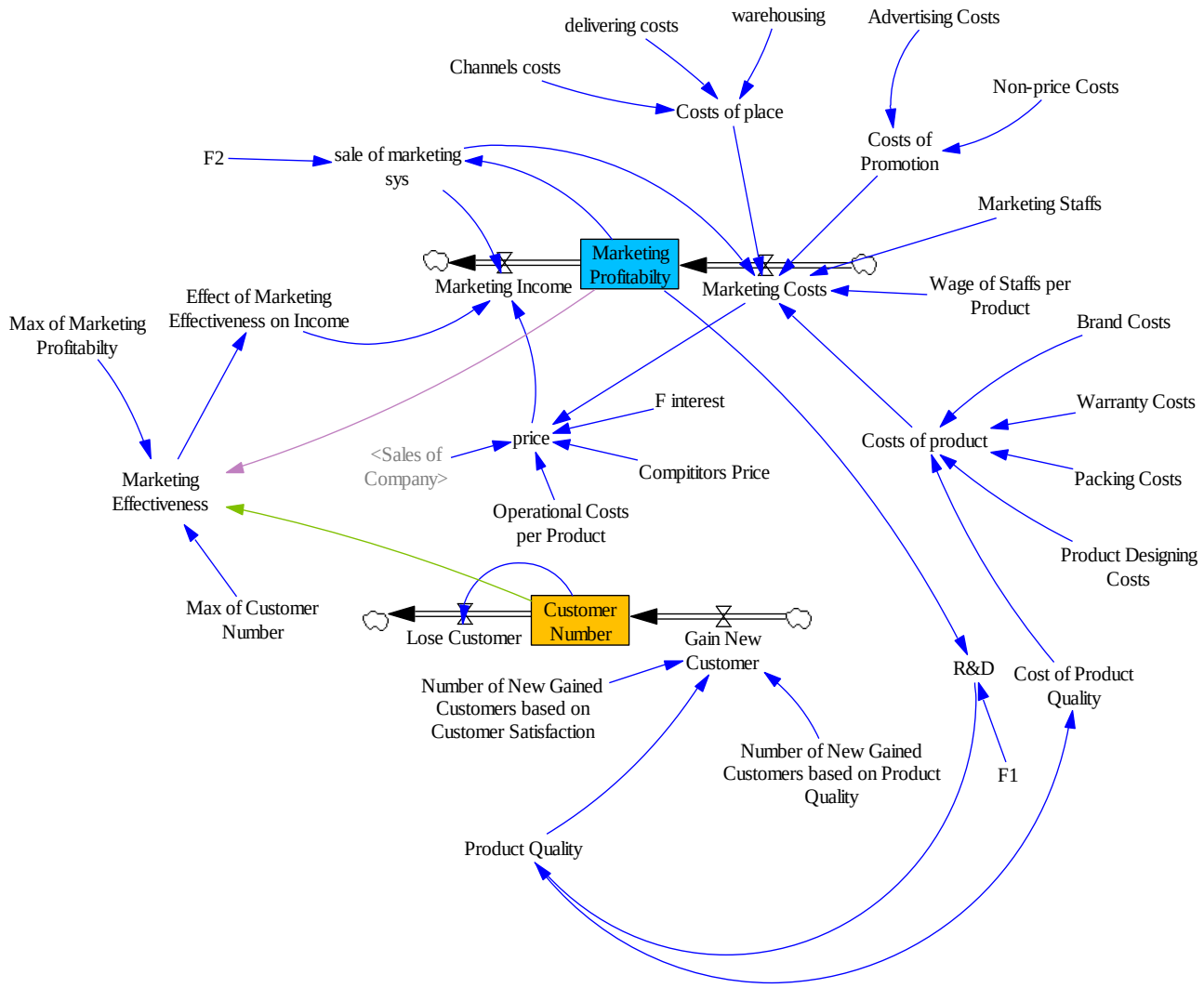

Figure 4

C. Sale Growth and Market Share

This part of the model displays influence of the Market Share and Sale Growth in the model. These variables are numbers between 0 and 1 automatically, so they can be used in the Marketing Effectiveness directly and without any fractions. Figure 6 shows how they affect the Marketing Effectiveness.

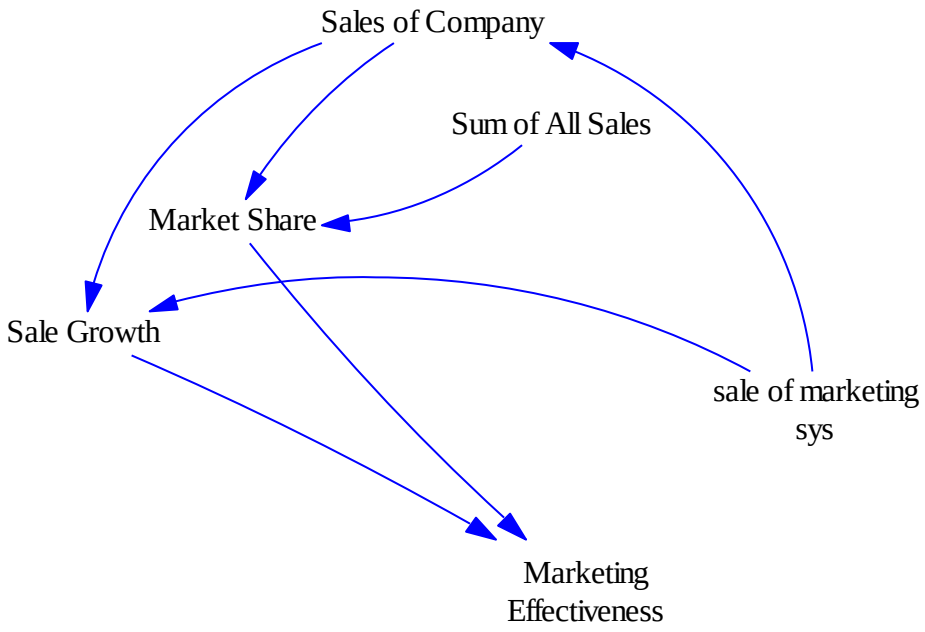

Figure 5

Some of the important variables of the model and the formulas of them are displayed in the Table 1. The majority of these formulas are based on Professor Davis' book (Davis, 2007) but some of them are based on the expert team's comments.

Table 1

Market Share	Sales of Company/Sum of All Sales
Customer Life Time Value	(price×Sales of Company)/(Customer Number×Churn Rate)
Sale Growth	sale of marketing sys/(sale of marketing sys+ Sales of Company)
Price	((Marketing Costs/Sales of Company)+Operational Costs per Product)×(1+F interest)
Cost of Product	Cost of Product Quality+ Brand Costs+ Packing Costs+ Product Designing Costs+ Warranty Costs
Customer Number	Gain New Customer-Lose Customer
Marketing Profit	Marketing Income-Marketing Costs

Finally, in Figure 7, the complete follow diagram has been shown.

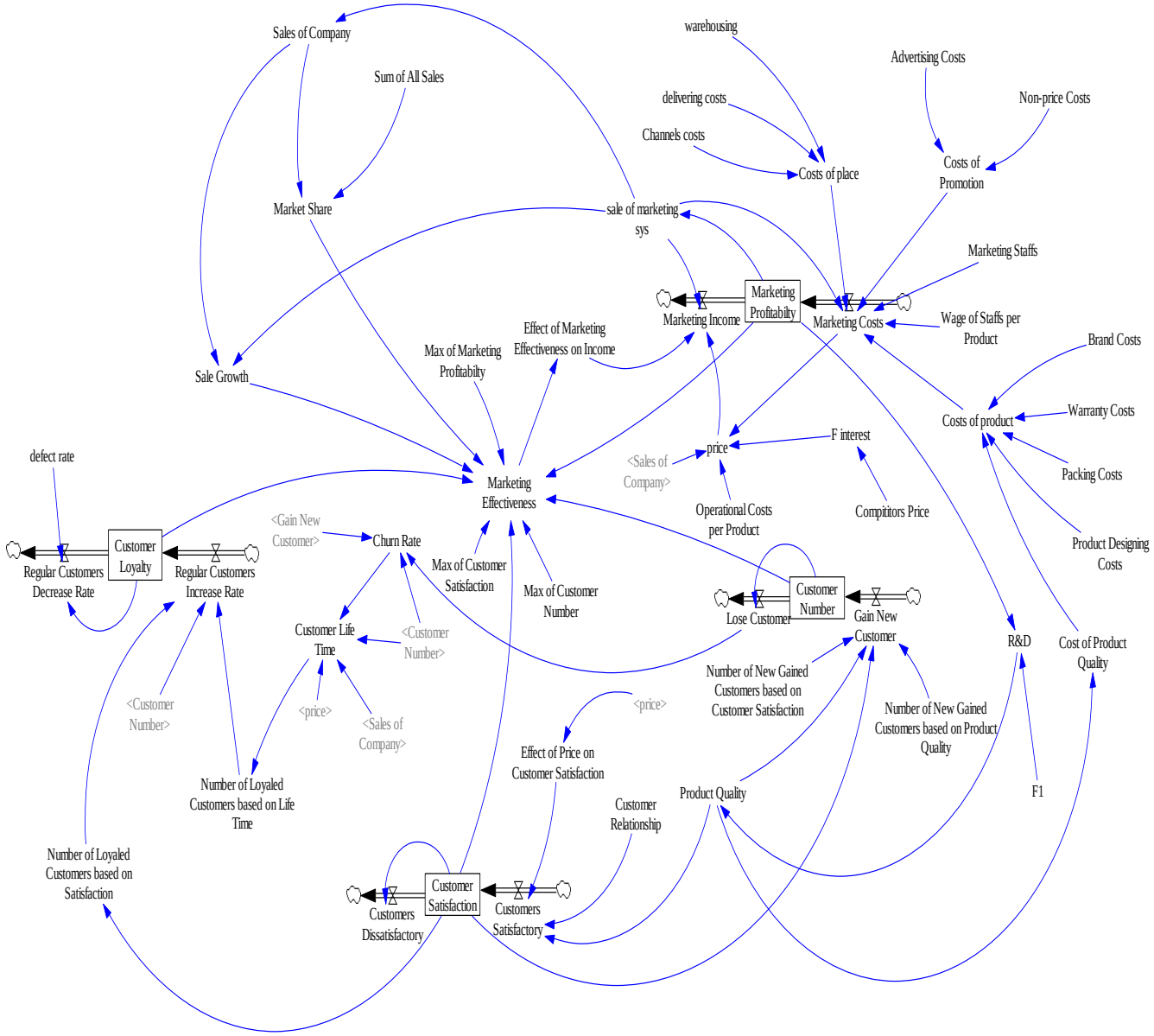

Figure 6

RESULTS AND POLICY ANALYSIS

In this section the article aims to observe the effects of some of the strategies on improving marketing effectiveness. To begin with, according to the researches and practices we know that variation of marketing systems are largely depends on marketing strategies. There are four grand classifications of strategies: Integration strategies, Intensive strategies, Diversification strategies and, Defensive strategies.

The paper plans to investigate the engaging of Intensive strategies on the marketing effectiveness. Without moving outside the organization`s current range of products or services, it may be possible to attract customers by intensive advertising, and by realigning the product and market options available to the organization. These strategies are generally refereed to Intensive Strategies or Concentration Strategies. By intensifying its efforts, the firm will be able to increase its sales and current market share of the current product-line faster. This is probably the most successful internal growth strategy for firms whose products or services are in the final stages of product life cycle. Most of the approaches of Intensive strategies deal with product-market realignments. Thus, there are three important Intensive Strategies (David, 2010):

A. Market Penetration: Market penetration seeks to increase market share for existing products in the existing markets through greater marketing efforts.

B. Market Development: Market development seeks to increase the sale by selling the present products in new markets.

C. Product Development: Product development seeks to increase the sale by developing new or improved products.

Given that the two strategies of above are engaging in current markets (Market penetration and Product development) and our model is based on the current market of the companies, the research illustrates the variation of the marketing effectiveness by altering 2 influential factors value in the model that strategist use them to carry out the marketing penetration strategy and product development strategy. The factors are sale of the company in the period of using new marketing system and investment on Research and Development of the products. Therefore our first and second scenarios are extracted from these strategies.

First scenario is increasing Market Penetration through enhancing of Market Share. To operationalize this scenario volume of marketing system's sale must be increased hence the fraction of investing on increasing of marketing system's sale (F2) is increased by 50%.

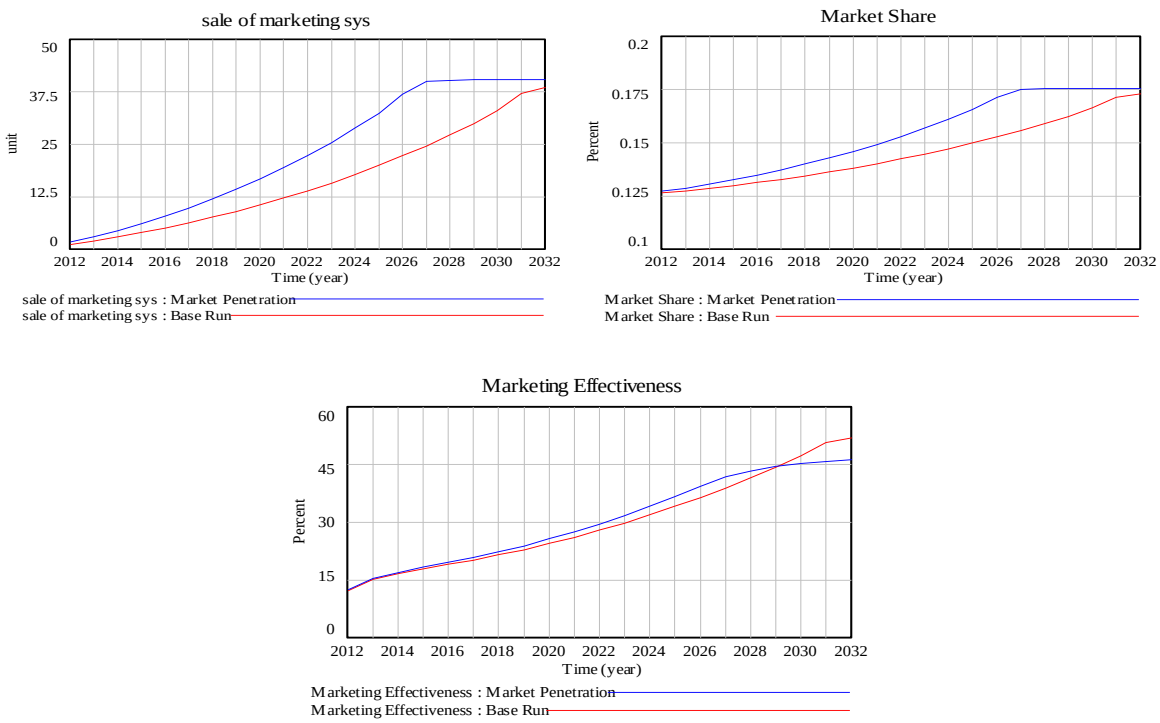

Figure 7

As shown in Figure 8, increasing of F2 causes to enhance of sale of marketing system and market share. Also it results growing of marketing effectiveness in the medium term but after 2029 it behaves in constant trend. The main causes of this behavior is this fact that over the time increasing of market share causes decreasing of profit because gaining new customers are not profitable.

The second scenario is product development through research and development (R&D) of product. For this purpose fraction of investing in R&D which is named F1 must be increased. In the second scenario F1 is increased from 0.05% up 0.08%. Because both R&D and customer satisfaction are qualitative variables so to quantify these variables Likert scale is used. In order to range these factors; R&D is limited between 0 and 5 and customer satisfaction variable is limited between 0 and 10.

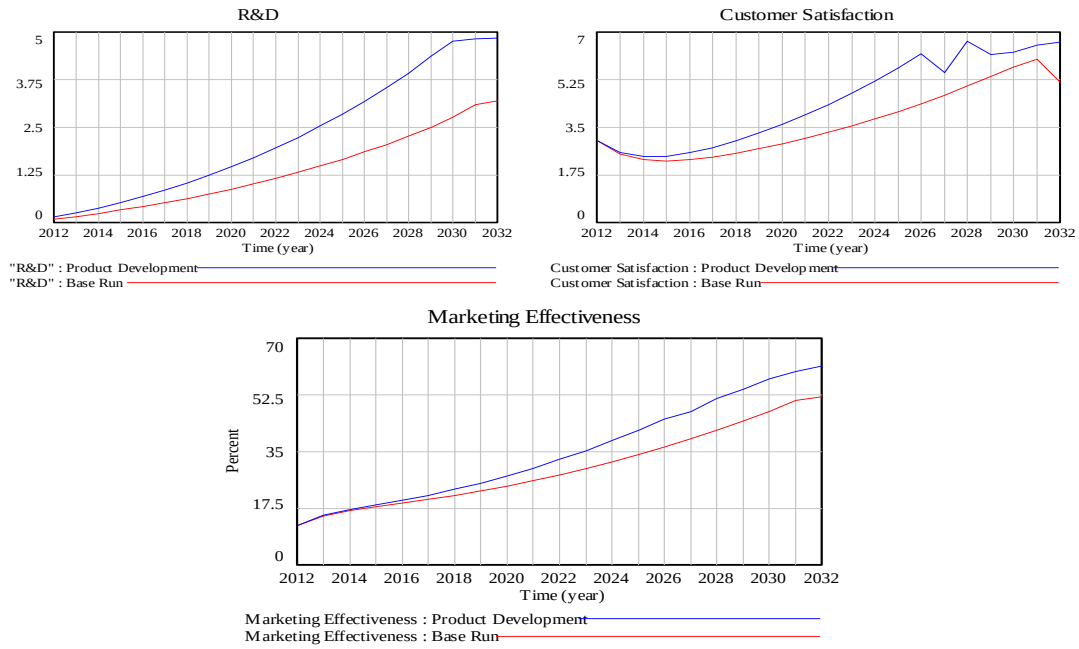

Figure 8

As shown in Figure 9, increasing of F2 fraction enhances R&D considerably. Because R&D effects directly customer satisfaction therefore growing of R&D increases customer satisfaction rate remarkably. As mentioned in the introduction, customer satisfaction is one of the impotent metrics of marketing effectiveness hence after rising of F1, marketing effectiveness will increase.

Third scenario is related to company's relationship with customers (CRM). It is well-established fact that properly dealing with customers would increase their satisfaction which is one of the important factors for improving of marketing effectiveness. This scenario explains effect of meliorating of customer relationship on marketing effectiveness. Customer relationship is qualitative variable and for quantifying this variable, it is limited between 0 and 10. To operationalize this scenario, customer relationship variable's amount is increased from 4 to 6.

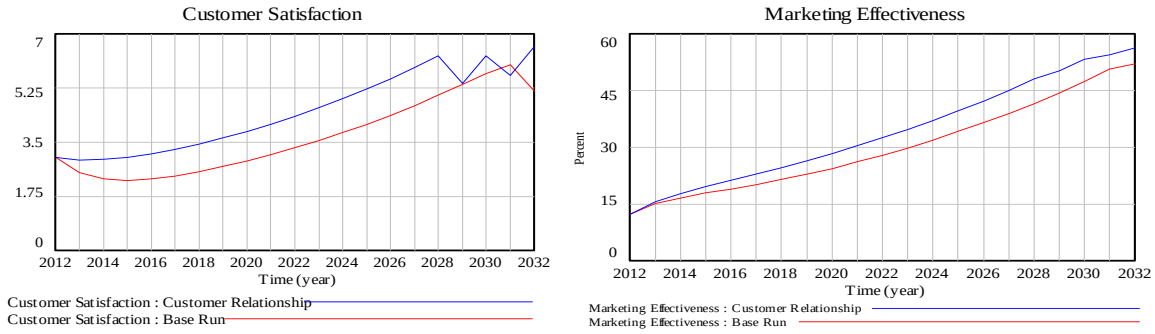

Figure 9

As shown in Figure 10, the direct relation between customer relationship and customer satisfaction causes increasing of customer satisfaction after enhancing of customer relationship.

Also because customer satisfaction effects directly on marketing effectiveness, its amount is increased up to 55% in 2033.

After describing impacts of these three scenarios on some important factors of marketing effectiveness system separately, in this section the paper will plots effects of these scenarios on marketing effectiveness system together to evaluate these scenarios.

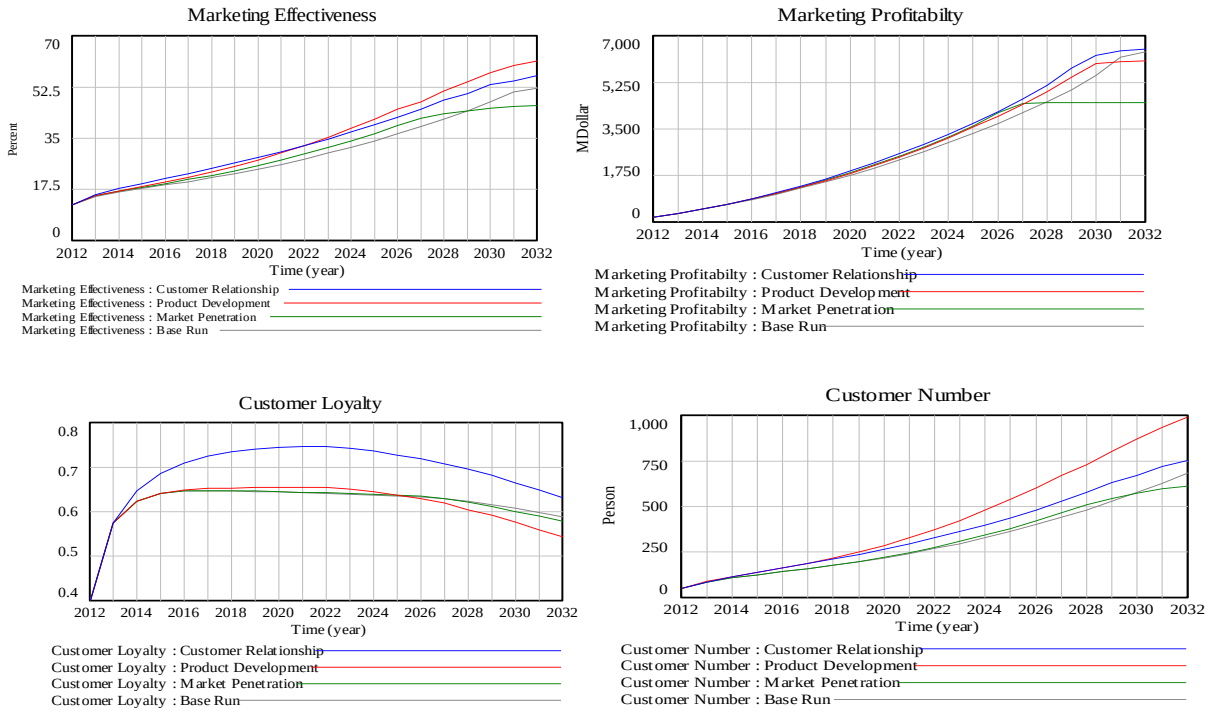

Figure 10

Figure 11 displays effects of each scenario on different variables of system. As indicated in this figure market penetration scenario has lowest effect on marketing profitability and product development has the most effect on it in long term. Before 2022 effect of customer relationship scenario is more than product development scenario because the impact of customer relationship cab be seen in long term but over the time the customers become accustomed to this behavior but R&D could effect in long term too because it causes gaining new customers that increases customer number and it influence directly marketing effectiveness. Also as shown in this figure the impact of customer relationship on customer loyalty is very considerable than other scenarios because it causes increasing of available customers satisfaction and this factor enhances regular customers number that is very crucial in customer loyalty rate. The other important issue in this figure is effect of product development on customer loyalty. At first increasing of R&D causes to customer satisfaction that increases customer loyalty but over the time, enhancing R&D reduces customer loyalty because the focus of R&D is on gaining new customers not on retention of available customers so that in the long term, growth of R&D will decrease customer loyalty.

As described in this section the model could simulate all of the important strategies of marketing effectiveness and could display desired and reasonable outcomes that are strong evidences for this model's validity.

CONCLUSION

Regarding the importance of evaluating marketing effectiveness in the present life and the future survival of the companies and the complexity of interactions among the measures, this article attempts to model it by the methodology of System Dynamics (SD). This model is mainly based on the measures that were gathered from the Industrial units of East Azerbaijan which is one of the most important industrial zones in terms of the number of manufacturing companies in Iran, and an expert panel as well. After presenting the model, the paper studies various scenarios of improving marketing effectiveness and finds the following insights:

The paper presents three scenarios. Two of them are based on the intensive strategies which are Market Penetration and Product development and the last one is about the managing customer relationship (CRM). The article studies these scenarios because of their crucial role on improving of the marketing effectiveness.

According to the results, the strategy of developing products has the most effect on marketing effectiveness by concentrating on the Research and Development (R&D) that leads to increase of customer satisfaction and subsequently marketing effectiveness. The second effective scenario is about the increasing customer satisfaction that leads to enhancing customer satisfaction and then marketing effectiveness. Finally, the last scenario is related to the applying market penetration by increasing the sales based on marketing activities that results in higher market share and improved marketing effectiveness.

By taking all above-mentioned arguments into consideration the following conclusion can be drawn about the issue: System Dynamics can be applied as one of the best methodologies of studying marketing effectiveness and it`s complex interactions among the measures.

The study has various limitations: First, the existence of numerous metrics that could be mentioned in the model. Second, the various scenarios that could be considered in this research. Third, the difficulty of gathering information from the companies of the research sample. In order to accomplish these limitations the paper considers the three major scenarios that greatly affect marketing effectiveness. For further researches we suggest that applying another metrics that could evaluate marketing effectiveness and presenting various scenarios as well.

REFERENCES

Adu, K. A., Fyall, A. and Singh, S. 2001. "Marketing effectiveness and Business performance in the financial services industry." *journal of services marketing*, vol. 15 no. 1, pp. 18-34.

Ambler, T. and Riley, D. 2000. "Marketing Metrics: A Review of Performance Measures in Use in the UK and Spain." *Draft Paper, London Business School*, pp. 1-30.

Barwise, P. and Farley, J. U. 2004. "Marketing Metrics: Status of six Metrics in Five Countries." *European Management Journal*, Vol. 22 No. 3, pp. 257-262.

Cizmar, S. and Weber, S. 2000. "Marketing effectiveness of the hotel industry in Croatia." *International Journal of Hospitality Management*, Vol. 19, pp. 227-240.

Clark, B. H. 1999. "Marketing Performance measures: history and interrelationships." *Journal of Marketing Management*, Vol. 5 No. 15, pp. 711-732.

David, R, Fred. 2010. Strategic Management , Prentice-Hall, Singapore.

Davidson, J.H. 1999. "Transforming the value of company reports through marketing measurement", Journal of Marketing Management, Vol. 5 No. 15, pp. 757-77.

Davis, John. 2007. Measuring Marketing: 103 Key Metrics Every Marketer Needs, John Wiley & Sons, Singapore, First edition.

Dunn, M. G., Norburn, D. and Birley, S. 1994, "The Impact of Organizational Values, Goals and Climate on Marketing effectiveness." *Journal of Business Research*, Vol. 30, pp. 131-141.

Faridyahyaie, R. 2011. *Identifying Marketing Effectiveness Metrics (Case of study: East Azerbaijan`s industrial units)*.Unpublished MS.c dissertation, Aras Institute of Higher Education, Tabriz, Iran.

Faridyahyaie, R. Faryabi, M. Bodaghi, K, N, H. 2012. "*Identifying Marketing Effectiveness Metrics – Case of study*: East Azerbaijan`s Industrial Units." *Journal of Business Excelence*, Vol. 6 No. 2, pp. 47-58.

Kotler, P. 1977. "From sale obsession to marketing effectiveness." *Harvard Business Review*, Vol. 55, November-December, pp. 67-75.

Kotler, P., Keller, K., Ang, H., Leong, S, and Tan, Ch. 2006. "Marketing Management an Asian Perspective." Prentice-Hall, Singapore, Forth edition.

Meyer, M.W. 1998. "Finding performance: the new discipline in management." performance Measurement – Theory and Practice, Centre for Business Performance, Cambridge, pp. 14-21.

Nwokah, N. G., Ahiauzu, A. I. 2008. “Managerial competencies and marketing effectiveness in corporate organizations in Nigeria.” *Journal of Management Development*, Vol. 27 No. 8, pp. 858-878.

Powell, Guy, R. 2008. Marketing Calculator: measuring and managing return on marketing investment, John Wiley & Sons, Singapore, First edition.

Webster, Cynthia. 1995, “Marketing culture and marketing effectiveness in service firms.” *Journal of Services Marketing*, Vol. 9 No. 2, pp. 6-21.

Yoon, S. J. and Kim, J. H. 1999. “The new approach to assessing the marketing effectiveness of Korean firms.” *Asia Pacific Journal of Management*, VOL 16, pp. 193-212.