Significant role played by Mathematics for effective teaching in Management Science

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Abstract

Today the mushrooming of colleges offering BBA and MBA courses and importance of Management Science led many a university to have the teaching of the subject, Mathematics in its core curriculum. Yet many in the teaching fraternity feel that students do not pay attention to Mathematics in the curriculum. This paper is an attempt to understand the need of Mathematics in Management Science, to know the different methodologies practiced by colleges offering Management courses and to suggest an effective teaching methodology to teach Mathematics in Management Science. Management Science needs construction and analysis of models with the help of Mathematics. Students need to study basic Mathematics so that they will be prepared to deal with the real world problems more effectively. To learn any subject students should be motivated. This paper focuses on certain factors that may be attributed for the students showing disinterest in Mathematics. But to achieve the objective of enhancing the students’ Mathematical ability, there is a need of effective use of teaching methodology.

Key words: Effective teaching methodology, Methodologies practiced, Significance of Mathematics.

Introduction

Significance of mathematics in Management Science

Management is by and large a science of choice and it is like an investment. It is the rational identification and realization of the best return on a set of resources for the achievement of a particular goal. Management is essential to get anything done efficiently, to make the best use of resources and to work through complexity. Any managerial decision will involve a number of alternatives, one or more of which are likely to be more desirable than others. To choose the most desirable alternative on the basis of a specified criterion is the technique of optimization, which requires a tool like Mathematics. The emerging problems in Industry require the techniques of Operations research, which is one of the modern areas of application of Mathematics. It has become imperative for managers to take the decisions on the calculations based on scientific principles, rather than deciding on the basis of intuitions. Every person needs to take correct decisions in his/her businesses or fields and he/she may be an Economist, Industrialist, Financial Analysts, Human Resource manager or a common businessman.

Management Science is the science for managing and helps in the process decision – making. The use of Mathematics in Management science started during Second World War to solve military and defense problems. In turn, this created faith that Mathematics could be applied successfully to any human endeavor and could yield valuable results. After Second World War, intensive efforts were made all over the world to mathematize many new areas of human activity and faith grew that Mathematics could have significant application in Biological, Social and Management Science. Management science focuses specifically on the development of mathematical models. These models help organizations to try out various activities with the use of a computer. Some of the fields which are included in Management Science are Decision Analysis, Optimization, Simulation, Forecasting, Game Theory, Network Modeling, Transportation, Mathematical Modeling, Data Mining, Probability and Statistics and Quantitative Methods. For decision making, it is very much essential to identify or formally define all significant interactions or relationships among variables relevant to the problem which will be in
terms of set of equations. The variables like sales, price, profit, and cost are used in Applied Mathematics. The interrelationship between the dependent and independent variables is established with the help of Mathematical functions by the rule of correspondence. Most common functions used in business are supply and demand functions, cost functions, profit function, revenue function, production function, utility function etc which is a part of Applied Mathematics.

It is very interesting to know that how Mathematics is related to other fields of Management. Statistics, be it Descriptive or Inferential Statistics, it is related to Mathematics whereas modern theory of Statistics is based on probability measures. Operations management helps organizations develop techniques to produce their products and services more efficiently through the extensive use of Operations Research techniques, which is considered to be an important branch of Applied Mathematics. Finance sectors use Mathematics to calculate the time value of money. It is used in Actuarial Science to calculate the overall investments, to discover how systematic and unsystematic risk affects the stock valuation. Also, commissions and odds can be calculated, price-to-earnings ratios may be compared, the results of various investment strategies can be graphed for comparison of the bond values, net asset value and the return on investment can also be calculated.

The businessman is more interested in profits and fixes the selling price of his product based on the cost price and desired markup on price and a retailer can convert markups based on selling price to markups based on cost and this is all done with Mathematics. As to run the business there is a need of human resources, for which the organization first forecasts the number of types of people needed to carry out the work of the organization at some future point in time, then decides about the normal, standard time of their work, incentive and salary plans are done through Mathematics.

Economics was the first Social Science to be developed mathematically. Mathematics is the language used by economist. Infact Econometrics is a highly developed Mathematical Science. Most of the Noble prizes in Economics have gone to those who have worked mathematical problems on Economics. Economic activities involve functions of more than one independent variable so it becomes inevitable to measure the effect of a change in the independent variables on the dependent variable in a multivariate function. The objective of the economist is to measure the risk; to decide the quantity of risk to be handled and to find out methods to eliminate unwanted risk by taking proper actions. To serve the objective of Management courses, certain topics of Mathematics are suggested as the prerequisites. Those topics are functions, linear algebra, set theory, matrix algebra, differentiation and applications of derivatives, integration and probability.

Hence simply put, Mathematics which is used as the foundation for all science courses, is also useful in Management courses. We can say that Mathematics is at present applied in controlling stocks, in determining recruitment policy for staff. It is applied in replacement of old machinery, in allocation of resources for optimum production, in determining how facilities for service should be increased to meet increasing demands. It is used in finding out how experiments should be carried out or surveys conducted to obtain reliable results, in determining the order in which operations should be done so as to avoid idle time on the machines. It also determines the route for a traveling salesman so that he covers all cities in minimum time, it is useful in controlling traffic flow on roads, in determining the correct storage policy for a dam, in determining strategies for war in calculating optimal orbits for space flight, in determining how races migrated in history etc.

**Importance of Teaching Methodology**

As future managers, all management students should know how to deal with uncertainty. For better management one should have analytical and logical thinking. Dr. Anice says Mathematics is the subject which encourages and develops logical thinking. Learning Mathematics develops ability to transfer the knowledge and skills learned through Mathematics to other context in the work place and in everyday
life. It should be stressed to students that professional work in a number of fields requires training in Mathematics and continual use of it. Many of the teacher fraternity always has a worry that students do not pay attention to this subject. Chris Lamoureux mentions that faculty of Business should concentrate on developing quantitative literacy and analytical ability in students. Rather than mere completion of syllabus, students should be able to use it as a tool to communicate analytical concepts. Mathematics faculty should impart to the students a sense of the importance of Mathematics as a necessary part in the development of successful business people. Though the success of every professional field demands for a sound knowledge of this subject nevertheless at post graduate level the students should be facilitated to think critically, to think independently, and to carry out confidently in their work. Hence it becomes very imperative for the teachers teaching management courses to inculcate the techniques and skills in students. As rightly said by Ahmed (2002), teaching methods should be intensively used to make learning process effective and usage of case method has to be increased.

As Management students are from heterogeneous groups, they are often found to be Mathematics phobic. The main reasons for this phobia are subject content, unawareness of practical usage of the subject, lack of motivation by teachers. To make them learn Mathematics, this phobia has to be lessened and passion and interest towards Mathematics have to be created among students. Motivating the students and sustaining their interest in learning Mathematics are the important tasks of a good Mathematics teacher. As pointed out by Mishra (2002), a teacher should be inspirer apart from instructor which again reflects on the importance of the methodology used in the classroom.

B. K. Prasad mentions that there is a need for paying attention on teaching methodologies. Main teaching methods used in Management education are lectures, case study, role play, field projects, and group work etc. In India lecture is the single most widely used method in most of the business schools. The research says that all available teaching methods should be used effectively and newer learning methods should be developed.

**Effective use of teaching methods**

As per Viswanadham, the increase in Management colleges has made the environment highly competitive which demands a value addition for learners whereas the traditional teaching methods should be redesigned and Management colleges should be able to use innovative and practical teaching methods like Management Games, Workshops, Seminars, Field surveys, Presentations, Individual Assignments, Case study, etc.

Dandapani’s study reveals that effectiveness of Mathematics teacher does not vary with their qualification, but vary with their experience which again points out towards the teaching method used in class. B.K Prasad suggests methods like lecture, drill work, assignment, group work can be effective to learn the subject content, but to impart the skills these methods should be supported by participative methods like case study, group learning, field study, decision simulations, role play, Mathematics club, Co operative learning. Lecture methods can also be made effective with students’ interaction through question- answer session, discussion. Students get convinced about the practical usage of the subject when teacher starts lecture with real world business problem. Dr Anice James suggests recreational and fun filled activities like games and puzzles to be practiced to create interest in Mathematics. He suggests that Mathematics club provides a lot of freedom of expression for the students and it supplements classroom teaching. The participative methods like Mathematics club or co-operative learning helps students to learn through peer interaction and learning takes place at their pace. These kind of participative activities promote critical thinking, high level thinking and improves problem solving. As per Mohanty (2002), the individual project work is also an important technique for all the subjects. For teaching, the method team teaching can be effective as it helps to teach the subject effectively and can evaluate its effect on the students periodically. It is also found that effective use of
technology helps in Mathematics education whereas computer-aided instruction can be effective at primary level of understanding.

**Conclusion**

Mathematics is a prerequisite to teach Management subjects to become a qualified manager. To impart skills and techniques of Mathematics in students, Management teachers should be motivators. They should make the students aware of application of Mathematics in real life situation. It is been said that most of the research work is done on the contents of MBA curriculum but much attention is not paid on methodologies. So there is a need to focus on it. For Mathematics teaching, the lecture method with interaction and with real world problem will serve the purpose. In addition to this, individual project work, assignments, drill work, group work can be used as teaching methods. These methods are not alone sufficient but they should be supported by participative methods like Co-operative learning, Mathematics club, Team teaching to develop their skills whereas to create interest and maintain it, games and puzzles should be used.

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