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Emerging Management Practices: Sustainability and Development

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CONTRIBUTION OF MATHEMATICS TOWARD SUSTAINABLE DEVELOPMENT**Mr. Ashish Dhara¹ and Dr. Manohar Bhagirath²**¹Assistant Professor, HOD, Department of Mathematics, Siddharth College of Arts, Science and Commerce, Fort, Mumbai, Maharashtra²Assistant Professor, Department of Mathematics, Annasaheb Vartak College of Arts, Science and Commerce, Vasai, Palghar, Maharashtra¹ashish_dhara@rediffmail.com and ²manoharbhagirath@gmail.com**ABSTRACT**

The development taken place in the past few centuries has raised concerns about the availability of the existing resources for the future. This encompasses problems like global warming global, climate change, rising sea levels, depletion of natural resources, hunger, rising population, and many more. These issues can be tackled by proper application of mathematics which can alleviate the impact and provide systematic, logical, and practical solutions ensuring sustainable development.

Abstract: Mathematics, sustainable development

INTRODUCTION

Sustainable development means fulfilling the present needs with technological advancement without endangering the prospects of future generations.

The development taken place in the past few centuries has raised concerns about the availability of the existing resources for the future. This encompasses problems like global warming global, climate change, rising sea levels, depletion of natural resources, hunger, rising population, and many more. These issues can be tackled by proper application of mathematics which can alleviate the impact and provide logical and practical solutions. Mathematics and nature inosculate with each other.

There are four major aspects of sustainable development: Culture, environment, society, and economy.



<https://vincemichael.wordpress.com/2014/08/23/sustainable-development/>

Conservation and development of each aspect are extremely important as they are interdependent. Mathematics through its capacity to understand and synchronize with nature has been providing far-reaching and meaningful solutions to the complications and impediments arising in the advancement in each of the aspects from time to time and contributing towards achieving the Sustainable development goals (SDG).

Contributions of Mathematics towards sustainable development:

CULTURE

Abidi (Abidi, 2020) defines culture as the values, customs, social relationships beliefs, art, and literature of an ethnic group.

1. Mathematics inspires artists and musicians: perspective symmetries, tilings, fractals, geometric curves, surfaces, and shapes; patterns, scales, and sounds in music.
2. Mathematics in form of geometry and patterns can be seen in artifacts, designs, and various other handicrafts.
3. Students receiving education in Mathematics can easily correlate with the knowledge they learn at home, thus giving a new dimension to the existing skill set leading to innovations and evolution of their art. (d'Entremont, 2015)

ENVIRONMENT

Environmental factors include energy, light, temperature, population sound, pollutants, and many more. Any aberration in any of these factors will disturb the existence of future generations.

1. Mathematics is one of the most vital contributors to the sustainability of the environment.
2. Mathematics-driven technologies are being used to find a less polluting sustainable alternative to existing sources of energy.
3. Improving grid management and networks improving combustion efficiency, optimizing non-alternative energy sources.
4. Optimization techniques and data analysis are needed in the move to sustainable use of world resources.

ECONOMY

Economics is very crucial for the future survival and prosperity of a nation, its population, and future generations.

1. Mathematics is ubiquitous and important to ensure a stable economy for the future.
2. Mathematics is useful in budgeting.
3. Mathematical models are used to predict future market behaviour and also provide real-life solutions.
4. Mathematics helps in Data Analysis and framing of policies for the poor and needy ensuring their survival.

SOCIAL

Social sustainability focuses on guaranteeing well-being, coherence, equality, and headway of society by constructing an all-inclusive infrastructure that will benefit society at large. (Kundu, April – June 2018)

1. Mathematical modelling of launching a satellite helps farmers, enhances security, and assists technological advancement.
2. Mathematical modelling of urban city planning ensuring better lives.
3. Mathematical models to estimate the population.
4. Mathematics helps in making more sophisticated medical equipment, vaccines, medicines, advanced treatments, etc.

CONCLUSION

Mathematics provides the most sophisticated tools and advanced technologies to ensure sustainable all-around growth that may ensure the existence of mankind for many centuries to come. It is up to us what kind of earth we want to hand over to our future generations.

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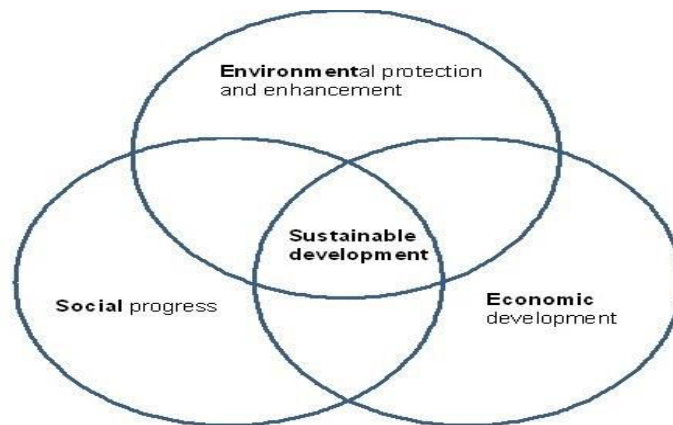
MATHEMATICAL MODELING TOWARDS SUSTAINABLE DEVELOPMENT**Dr. Manohar Bhagirath² and Mr. Ashish Dhara¹**¹ Assistant Professor, Department of Mathematics, Annasaheb Vartak College, Vasai, Palghar, Maharashtra² Assistant Professor, HOD- Department of Mathematics, Siddharth College of Arts, Science and Commerce, Fort, Mumbai, Maharashtra¹manoharbhagirath@gmail.com and ²ashish_dhara@rediffmail.com**ABSTRACT**

Mathematics plays a major role in sustainability and development. Mathematical modeling plays an important role in making predictions about the real world as well as understanding situations. This chapter describes the need for mathematical modeling towards sustainable development.

Keywords and phrases: Development, Mathematical Modeling, Sustainability.

INTRODUCTION

There is a correlation between sustainable development and mathematics. The process of developing a mathematical model is called mathematical modeling. Mathematical models are used in social sciences, natural sciences, and engineering branches. Despite it being necessary to understand the science of the emergence and strengthening of environmental patterns to develop sustainability, it is not enough. (Levin, 2013) Sustainable development is to balance our society, environment, culture, and economy. Comprehensive mathematical models play an important role in sustainable development and therefore it is necessary to create comprehensive mathematical models. (Kundu, Mathematical Modeling As A Tool For Sustainable Development, 2018).



The figure shows what is sustainable development?

Source: <https://www.fdsd.org/the-challenge/what-is-sustainable-development/>

Relation between Mathematical Modeling and Sustainable Development.

In sustainable development, we can balance development if we follow the laws of nature for human development. Mathematical modeling is an arrangement of language and mathematical concepts. Mathematical modeling also includes the goal of sustainable development by transforming problems into real or reliable situations. Numerical weather forecasting (NWP), climate change, economic, environmental, environmental impacts, and population dynamics are some of the global sustainable development problems that can be solved by obtaining information through mathematical models.

Why Do We Need Mathematical Modeling for Sustainable Development?

The following are some of the reasons why we need mathematical modeling for sustainable development.

- Mathematical modeling is a powerful tool for accurate prediction and control and it drives sustainable development.
- Allows more efficient use of modern computing capabilities.
- Creates a balance between economic, social, and environmental needs.
- To protect human life/growth.
- It helps to instruct policies and decisions.
- Mathematical models are useful for launching satellites, pollution control, and predicting the arrival of the monsoon.

Therefore, more mathematical models need to be created to solve the problem of sustainable development.

Constructing Mathematical Models for Sustainable Development:

It is important to include the following factors when creating mathematical models for sustainable development.

- Identify the problem and specify it.
- Keep parity.
- Build the structure of the mathematical model.
- Formulate and solve Mathematical Models.
- Verify the mathematical model by analyzing it to realism.
- Use the model to make sure it is working properly. Also, check its results.
- The model should have the necessary structure of objects or events that need to be changed or handled with relative ease as well as simplification.

Almost all problems can be solved by mathematical methods that can lead to research that will help you lead to sustainable development.

Summary:

In this chapter, we observed that Mathematics plays a major role in sustainable development in almost all aspects of nature. Many developmental challenges for sustainable development can be solved with the help of mathematical models. These models also, help to develop management strategies. Therefore, emphasis should be laid on making as many mathematical tools as possible.

Conflicts of Interest: The authors declare no conflict of interest.

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