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Dr.K.Sasi Kumar

Editor-in-Chief

SUSTAINABLE ECONOMIC DEVELOPMENT - INDIAN PERSPECTIVE

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SUSTAINABLE ECONOMIC DEVELOPMENT - INDIAN PERSPECTIVE

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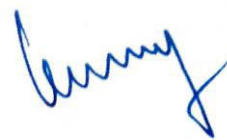
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EDITORIAL MESSAGE

We take great pleasure in welcoming you to our Edited Book. The immediacy of e-based publication makes it possible for us all to be fully connected to each other and to developments in our field and to be directly involved in ongoing knowledge construction.

With several economies gearing towards the end of lockdowns, it's time for organizations to implement Post-COVID-19 business recovery strategies. Although it will let organizations restore balance to an extent, total recovery from the crisis is going to be a long and strategic battle. With these concepts in mind, we invited with scholarly discussions to facilitate new ideas for business sectors. This book also stands as a platform for Students and research scholars to express their innovative business models and solutions.

We are thankful to all academicians, research scholars and students who have contributed for this edited book. We also acknowledge the valuable suggestions and support offered by our colleagues and students. We are delighted that you are joining us as readers and hope you will also join us as contributors.



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DISCRETE MATHEMATICS FOR SUSTAINABLE DEVELOPMENT OF ECONOMICAL GROWTH IN INDIAN PERSPECTIVE

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ABSTRACT

The sustainable development of economical growth in prescriptive has been in the formation of models in discrete mathematics as a mathematics in theoretical as well as real world economic analysis. It focuses on use of different mathematical operational tools and mathematical Economics is that it helps to solve the optimisation. The framework of Economic model can be mathematical and non-mathematical in nature. Mathematics allow economists to form meaningful, testable propositions about wide-ranging and complex subjects which could less easily be expressed informally. Further, the language of mathematics allow economists to make specific, positive claims about controversial or contentious subjects that would be impossible without mathematics. Much of economic theory is currently presented in terms of mathematical economic models, a set of stylized and simplified mathematical relationships asserted to clarify assumptions and implications.

BROAD APPLICATIONS INCLUDE

- Optimization problems as to go to equilibrium, whether of a household, business firm, or policymaker
- Static (or equilibrium) analysis in which the economic unit (such as a household) or economic system (such as a market or the economy) is modeled as not changing
- Comparative statics as to change from one equilibrium to another induced by a change in one or more factors
- Dynamic analysis, tracing changes in an economic system over time, for example from economic growth.

Formal economic modeling began in the 19th century with the use of differential calculus to represent and explain economic behaviour, such as utility maximization, an early economic application of mathematical optimization. Economics became more mathematical as a discipline throughout the first half of the 20th century, but the introduction of new and generalized techniques in the period around the Second World War, as in game theory, would greatly broaden the use of mathematical formulations in economics.

This rapid systematizing of economics alarmed critics of the discipline as well as some noted economists. *John Maynard Keynes, Robert Heilbroner, Friedrich Hayek and others have criticized the broad use of mathematical models for human behavior, arguing that some human choices are irreducible to mathematics.*

INTRODUCTION

Sustainable Economic Growth in India

Sustainable economic growth is economic development that attempts to satisfy the needs of humans but in a manner that sustains natural resources and the environment for future generations. An economy functions in the ecosystem. We cannot separate the economy from it. In fact, an economy cannot exist without it. The ecosystem provides the factors of production that fuels economic growth: land, natural resources, labor, and capital (which is created by labor and natural resources). Sustainable economic growth is managing these resources in a manner that they will not be depleted and will remain available for future generations.

While many economists and people disagree about the importance of the environment regarding economic activity, the following facts are seldom disputed:

1. The extraction and depletion of natural resources, as well as pollution and permanent changes made to the landscape, are caused by economic activities and can do harm to the environment.
2. Many of the costs of the harm created by economic activities are not borne by those who cause it but by other people who neither obtain the benefits from the economic activity nor agree to pay the costs related to it. Pollution is a perfect example. Businesses are permitted to pollute to a certain degree (less now than in the past). They don't have to pay for the pollution, but society does by dirty air, water, and contaminated soil that affect the quality of our air, water, and food. This pollution can lead to serious health effects, which may reduce the quality of life and health of the population. We call a cost borne by someone who did not agree to bear it an **externality**.

3. Humans live in an ecosystem and cannot survive without it. If we destroy the environment, we will eventually destroy ourselves.

The Use Graph Theory to Build a More Sustainable World in Discrete

Mathematics: Discrete mathematics is an area of math based on the study of formal structures whose nature is fundamentally separate and distinct.

This means it focuses on integers and natural sets of numbers, shapes, and other objects that you can count **finitely** or distinguish from one another. It models reality in a manner specifically suited to certain real-world applications.

From industry and logistics to computer science and telecommunications, having a quantized representation of everything around us has led to magnificent advances in our understanding and control of the physical world.

It's important to have at least a rough idea of the main distinctions between discreteness and continuity to address **graph theory**. But these aren't very well-known concepts to people outside the world of mathematics.

At first, continuous math is the one predominantly taught in the education system due to its versatility, usefulness, and practicality in most areas. It's based on the analysis of real numbers and functions that encapsulate mappings between these quantities, along with the notion of the infinitesimal change of a variable. This results in a series of tools like limits and derivatives that constitute **calculus**.

On the other hand, the discrete paradigm is more straightforward and intuitive, with the exception of a few cases. And its finiteness is given by the primordial element constituting **its sets**.

Among the most notorious use areas are those whose main components imply algorithms and data structures. Although the use cases of math are not what most people think they are.

In the real world, we don't often face problems in the same way as in the education system. Indeed, discrete ways of approaching riddles and modeling the input data we need to come

up with a solution are more usual than continuous ones, especially regarding system optimization issues.

For this reason, we should reconsider the role of this way of doing mathematics since it involves the development of **critical/computational thinking**. This is crucial for the current era in which we are surrounded by technology. It also involves the improvement of problem-solving skills, making it possible for us to face any new challenges.

By doing so, we can see how relevant it is to apply a solid mathematical foundation to common global threats that are increasing daily, like misinformation, lack of fluency in handling technology, geopolitical instability, and even climate change.

Notwithstanding the apparent remoteness between the latter issue and graph theory itself, we should think about the way we live and the system by which our civilization is maintained as



Fig.1. Dual channel network structure in Logistics.

SUSTAINABLE MANAGEMENT IN DEVELOPMENT

The sustainable development divides the components into three elements: social, economic, and environmental. Social components include workers' health and safety, equal opportunity, quality of life, and benefits to disadvantaged groups. Economic components include creation for new market and opportunities for sale growth, cost reduction through efficiency and improvements, and reduces energy and raw material inputs. Environmental components include an unpolluted environment, effluents generation, and emission into environment, resource management, habitat restoration and preservation, use of renewable raw material, and elimination of toxic substances.

The sustainable development is essential for the following issues:

- To prevent the environmental degradation
- To ensure human life
- To check the exploitative technology and find alternative sources
- To check the overexploitation and wastage of natural resources
- To regenerate renewable energy resources etc.

The need mathematical modelling

The Mathematical modelling are recognized as effective tool that could help examine economic, environmental and ecological impacts of alternative pollution control and resources- conservation actions, and thus aid planners or decision makers in formulating cost effective management policies. Managing for sustainability raises a suite of mathematical problems, from the dynamics of population growth and population interactions, to the development of sustainable energy sources, to the creation of management strategies for dealing with public goods and common-pool resources. Most of the problems can be resolved with the mathematical methods that are likely to stimulate much research which will help our societies achieve a sustainable future we know it.

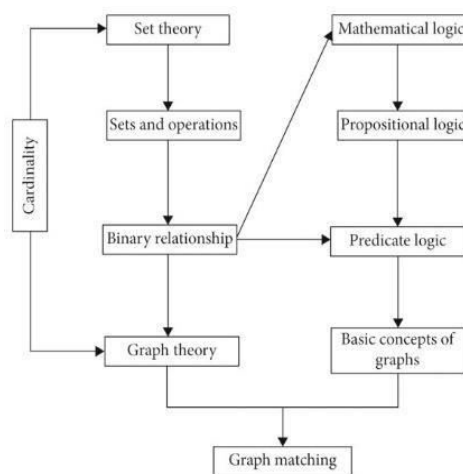


Fig.2. Mathematical modelling

Mathematical models sustain the majority of human activity on the planet and are used to solve many real-life situations like:

- ❖ Mathematical modelling of launching a satellite.
- ❖ Mathematical modelling of urban city planning.
- ❖ Mathematical modelling of controlling pollution due to vehicles.
- ❖ Mathematical modelling of the traffic flow on highways or the stock market options.
- ❖ Mathematical models to understand the working of heart, brain, lungs, kidneys, and the Endocrine system.
- ❖ Mathematical models to estimate the population of India in the year 2050 AD
- ❖ Mathematical models to demonstrate the action of medicine in the human system.
- ❖ Mathematical models for global warming.
- ❖ Mathematical models to understand the fluid flow in drains, lakes, rivers, spillways etc.

Mathematical versus Non-mathematical Economics

There is no fundamental difference between mathematical and non-mathematical approach to economic analysis. The objective of any economic analysis, whether it is mathematical or non-mathematical in nature, is to obtain a set of conclusions from the set of economic analysis. Firstly, in mathematical economic analysis, assumptions and conclusions are expressed in mathematical symbols or operations and equations rather than words and sentences respectively. Secondly, literary logic is replaced with mathematical theorems which aids to draw upon abundance of reasoning in the process. words, so it does not matter much what is chosen over the other. Mathematics forces the analyst to state assumptions explicitly at every stage just because mathematical theorems are usually stated in the 'if-then' form, so to get the then (result) part of theorem for their analysis, they should see that 'if' or conditional part does conform to the assumptions mentioned.



Fig.3.Mathematical versus Non-mathematical Economics

1. QUANTIFICATION

In economic analysis forecasts are made with the help of a diagram. For example, in a competitive market if supply is increased then the price of a good falls. However, there is a very common economic intuition behind it which any market player can analyse.

Sometimes the economic analysis that are non-mathematical in nature can also be useful for predicting the direction of expected change which are non-quantitative in nature.

2. SIMPLIFICATION

Algebraic expressions make some economic concept or relationships much easier to understand than if they were expressed in words.

CONCLUSION:

Mathematical modelling plays a vital role in sustainable management practice or process in all aspects such as social, environmental and economical studies. Many developmental challenges could be solved by mathematical models that could describe them. The sustainability of planet earth depends on mathematical science. Thus the discrete

mathematics plays a major role in the development of sustainable development of economical growth it may helps for the future development of our country India and also the World.

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