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## USING INFORMATION TECHNOLOGY IN ECONOMICS AND STATISTICS – PROBLEMS AND PERSPECTIVE

**Abstract:** This paper provides an overview of the use of information technology in statistics. Statistics play a significant role for the government to develop policies, manage the economy, and improve the living standards of the people. Advances in information technology have made it easier to disseminate official statistics to the masses. The World Health Organisation (WHO) provides statistical data of COVID-19 through WHO Coronavirus Disease (COVID-19) Dashboard every day that can be accessed by people all over the world through the internet. Information technology can play a major role in faster dissemination of official statistical data, improving accuracy, storage, and processing of a large amount of data. Statistical agencies around the world are using information technology to improve official statistics on a wide range of topics. With the help of information technology, AI and machine learning can apply to make a better decision about the present and prediction for the future.

### **I. Introduction.**

Statistics is as old as human society. In India, during the reign of Mughal Emperor Akbar, we find detailed accounts of the administrative and statistical surveys conducted in the book *Ain-i-Akbari* or “Administration of Akbar” written by his court historian Abu Fazl (in 1596-97) in the Persian language [1, p. 1.1]. In modern days with the advent of information technology, statistics is not only applied in administration but also to the field of planning, economics, business, industries, biology, astronomy, psychology, education, medical science, and many more. The theoretical development of modern statistics came during the mid-seventeenth century with the introduction of the ‘Theory of Probability’. Organizations use

information technology to reach masses with targeted messages over the internet. Information technology helps governments, businesses, and international organizations to process large amounts of data and run statistical analysis to achieve their goals. With the advancement of information technology, it became possible to reach the people within a new framework. The main users of official statistics are different government bodies at the central, state, and district levels, corporates, international organizations, and research institutions. In the mid-1990s, national statistical organizations started to create their first websites. The United Nations Statistics Division, in its mission to promote the development of national statistical systems, has developed a central repository of country profiles of statistical systems.[2] Open Government Data (OGD) is a platform to support the open data initiative of the Government of India. The portal is used by various Ministries/Departments to publish datasets, documents, services, tools, and applications collected by them for public use so that anybody can go to the website, download the data and start working. It is to increase transparency in the functioning of the government and for innovative uses of Government Data to give a different perspective. It is made possible only because of the information technology and, as a result, this database can be accessed from anywhere in the world by any individual or organization restricting not just to one country India. With the unprecedented development of the internet during the last decade, the main channel for dissemination of information for any statistical agency is information technology.

## **II. Statistics.**

The definition of statistics given by Croxton and Cowden, according to whom Statistics may be defined as 'the science which deals with the collection, analysis, and interpretation of numerical data.' The statistical methods are use full for the socio-economic development of the country. The government all over the world are committing to improving the national statistics system. It's not constricted to the affairs of the government but also intruding into various spheres such as social, economic, and political. It has become indispensable. The list of a few fields in which statistics applied is as follows.

**Economics:** Statistical techniques are immensely useful in solving economic problems, such as wages, analysis of times series, prices, and demand analysis. The statistical methods help to study the relationship between supply and demand, import, and export. Applications of statistics and mathematics have led to the development of new disciplines such as Economic Statistics and Econometrics.

**Business:** The success of a business depends on the accuracy and precision of statistical forecasting. Many industrial and commercial enterprises are employing statisticians to understand customer needs and plan production. The quality of the product can also be check by using statistical methods such as statistical quality control.

**Medical Science:** Statistical techniques are used for the collection, presentation and analysis of research data. The efficacy of drug or medicine is tested by using the 'test of significance' - (t-test).

**Banking:** A bank is a financial institution that accepts deposits from the public and makes loans. The bank works on the principle that everyone who deposits their

money does not withdraw it at the same time. Bank uses statistical methods to calculate the number of people who will come every day to deposit or withdraw.

### **III. Using Information Technology in Statistics.**

Information Technology (IT) means the use of hardware, software, services, and supporting infrastructure to manage and deliver information using voice, data, and video.[3] The development of information technology has generated a large amount of data. As a result, our data collection capabilities have increased. Apart from numeric data, we can capture and store speech, images, and videos. With the exponential growth of the internet over the last decade, it will be the main channel for any organization to disseminate statistical data. Statisticians use techniques such as exploratory data analysis (EDA) that gives insights about variables, data types, shape, and distribution of the population, which then leads to hypothesis testing. They apply theoretical knowledge to solve complex problems. When the sample size increases, it becomes difficult to analyse data with hands. To overcome this problem information technology helps statisticians and other individuals from the quantitative field such as economics to apply statistical methods on large data set to uncover hidden patterns, trends, and correlation. Apart from traditional statistics, machine learning, data mining, and artificial intelligence are giving exceptional results. Machine learning is the science of getting computers to learn without being explicitly programmed. It is a subset of Artificial Intelligence (AI). Data mining is the process of extracting useful information from a large data set. Artificial Intelligence makes it possible to simulate human intelligence in machines that are programmed to think and mimic like humans.

### **IV. Problems.**

Lack of IT experience may be one of the problems for the statistical organization because statisticians are not familiar with programming and computing. To store and process a large amount of data, data warehousing (DW) is needed. The management of statistical information is not possible without the support of modern information technology architecture. It is expensive to set up a data warehouse for exploratory data analysis and data mining. Developed countries national statistics offices can set up a data warehouse, but it is difficult for backward countries. There are two types of data warehouse, a conventional data warehouse, and a statistical data warehouse. A statistical data warehouse is used for exploratory data analysis. In many countries, the lack of legislation may prevent web-enabling of official statistics. Official statistics provide information about the economic, demographic, social, and environmental affairs of the state. Data collected by the statistical organization for statistical analysis are to be strictly confidential and use exclusively for statistical purposes and not sell to the third party. The laws under which the statistical system comes are to be made public. In the recent past, we have seen how millions of Facebook user's data was leaked for political advertising.

### **V. Perspective.**

In the 21st century, the success of statistics depends on how we collect, store, process, analyse, and disseminate information. While conducting a survey or census software, shall include for a manual data entry along with the traditional printed questionnaires. The quality of data should also improve by introducing software that can flag the data as invalid if a person writes a number instead of alphabets while

collecting data. The data should be made available to the public, scholars, and economists to study and research. The national statistics office shall be well equipped with the latest technology and software. It must have a good infrastructure for data collection and processing, such as database, networking, and hardware.

## **VI. Conclusion.**

Over the years, information technology has revolutionized our world. Computers are faster and very powerful than ever before. Artificial Intelligence (AI) and machine learning are the future. Statisticians are becoming a data scientist. It's the right time for national statistics offices across the world to modernize themselves and make better use of data for policymaking and decision making.

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## **СИСТЕМА СТАТИСТИЧНИХ ПОКАЗНИКІВ КНИГОВИДАВНИЧОЇ ГАЛУЗІ: ПРОБЛЕМИ ТА ПЕРСПЕКТИВИ УДОСКОНАЛЕННЯ**

Відомо, що однією з головних вимог, які висуваються як до статистичної звітності так і до поданої в ній інформації, є якість, що уособлює в собі багато різноаспектних критеріїв, серед яких вичерпність даних, їх точність, достовірність, гармонізованість та своєчасне опрацювання. Забезпечення формування та функціонування якісної статистичної звітності дає змогу в повній мірі оцінити стан галузі, виявити прогалини у діяльності, дослідити динаміку показників та спрогнозувати подальший розвиток. У випадку недосконалої звітності, є ймовірність упущень через невиявлені дані важливих сигналів галузі про майбутні (або наявні) проблеми.

У п'ятому Фундаментальному принципі офіційної статистики зазначено, що дані для статистичних цілей можуть збиратися з будь-яких джерел на підставі як статистичних спостережень так і адміністративних звітів, а статистичні відомства повинні обирати джерело з урахуванням якості, своєчасності, витрат та навантаження на респондентів [1]. Формою статистичного спостереження є статистична звітність, що передбачає заповнення спеціально затверджених документів (звітів), за якими відповідні