STATISTICS IN PLANNING AND DEVELOPMENT

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ABSTRACT

Everyone related to statistics is likely to remember the year 2013 as the International Year of Statistics (IYS)[1] and engage in increasing public awareness of the power and impact of statistics on all aspects of society. Statistics has become an integral part of almost all spheres of modern life. It is being increasingly applied for both private and public benefits including business and trade as well as various public sectors, not to mention its crucial role in research and innovative technologies. No modern government could conduct its normal functions and deliver its services and implement its development agenda without relying on good quality statistics. The key role of statistics is more visible and engraved in the planning and development of every successful nation state. In fact, the use of statistics is not only national but also regional, international and transnational for organisations and agencies that are driving social, economic, environmental, health, poverty elimination, education and other agendas for planned development. Starting from stocktaking of the state of the health of various sectors of the economy of any nation/region to setting development goals, assessment of progress, monitoring programs and undertaking follow-up initiatives depend heavily on relevant statistics. Only statistical methods are capable of determining indicators, comparing them, and help identify the ways to ensure balanced and equitable development.

1. INTRODUCTION

Planning and development are essential parts of routine activities of any effective government working for the welfare of its citizens. Planning is one of the keys to targeted, planned and balanced development. The performance of any government is judged by the level of development it may have achieved for the nation. However, planning and development are not exclusive to government any more. In fact all modern businesses and institutions practice planning to implement their strategies and allocate resources to achieve their set goals. Not surprisingly well over 2,000 organisations across the globe are celebrating 2013 IYS. A global map indicating as well as listing of all countries/organisations signed up for the celebration is found on the official website of Statistics 2013.[2] The United Nations Secretary-General met a delegation of the International Statistical Institute (ISI) and was pleased to know the global initiative to

celebrate 2013 as the International Year of Statistics. He stressed the importance of Statistics for informed policy making and for good functioning of the society in general.[3]

There is no need to overstate the crucial role of statistics in the national and international development initiatives, monitoring and assessment. The Partnership in Statistics for Development in the 21st Century (PARIS21) was founded in November 1999 by the United Nations, the European Commission, the Organisation for Economic Co-operation and Development, the International Monetary Fund, and the World Bank, in response to the UN Economic and Social Council resolution on the goals of the UN Conference on Development.[4] Another recent well-known project of the United Nations is the Millennium Development Goals (MDG) to end poverty by 2015.[5] There are eight specific goals (poverty/hunger, primary education, empowering women, child mortality, mental health, combat AIDS/malaria, environment, development partnership) included in the MDG, and every one of them requires reliable, timely and accurate statistics to measure any significant improvements to meet the goals. Everything starting from the determination of appropriate index to measure any of the above variables/goals of interest, set up the current benchmark, predict future targets, and provide regional and international comparisons requires statistics.

There have been some systematic discussions on the role of statistics in planning and development in recent years. Rice (1997) discussed the role of statistics in the development of health care policy.[6] Makwati et al. (2003) discussed the role of statistics in improving the quality of basic education in Sub-Saharan Africa.[7] Bourguignon (2005) covered the role of statistics in the scientific approach to development.[8] Khan (2007) highlighted the importance of statistics for development of any nation.[9] In 2007, His Excellency Paul Kagame, President of the Republic of Rwanda, emphasized the importance of statistics for policy-making in Africa in a presentation in Kigali.[10] Shangodoyin and Lasisi (2011) wrote on the role of statistics in national development with reference to Botswana and Nigeria Statistical Systems.[11]

2 WHAT IS STATISTICS?

Statistics are the numerical mirror of the society, country and world. It reflects on, and helps visualize the reality around us. It also exposes, and helps explain, the facts that characterize our population, society, economy, health, education, environment, and nation as a whole. It gives us a benchmark of the state of any nation at a particular time, and measures the changes that may have happened over a specified time period. It can provide information via data collected simply by observing any phenomena of interest, or set/conduct controlled experiments allowing intervention, and measure any changes in the effects or responses. Statistics is essential for ensuring the transparency and accountability of authorities and a reliable guide for good governance.

How do you measure the literacy rate of any nation? How to work out its current unemployment or inflation rate? How could a doctor decide if a new drug is effective? How does she distinguish between cancer cells from normal/healthy cells? How to compare two or more treatment means? How do you detect climate or environmental changes? How would an engineer find out which brand of car is more fuel efficient? What method would he use to predict the traffic flow on the national road system? What

about estimating the inflation rate and consumer price index? What technique is used to determine the fertility rate or population growth rate? How would you forecast the number of doctors, engineers, schools, hospitals, transport requirement, child/old age care facilities? How do you model a dataset with a dependent and several independent variables? How to find any association between two or more variables? All of the above and much more essential information required for the planning of any civilized society are produced by statistical methods and tools.

Statistics are the main building blocks of any short or long term planning of any responsible government and business, be it local, regional, national. It provides fundamental information on the current state of the phenomenon of interest and help model the underlying variables which in turn can be applied to forecast the future outcomes. Balanced and desirable development of any nation largely depends on sound planning, and its effective implementation for the wellbeing of the citizens and communities. Furthermore, monitoring of the progress and implementation of the planning measures and their effectiveness as well as subsequent assessment of outcomes require appropriate statistics.

"Statistics is the grammar of science." Karl Pearson.[12]

It is important to view `planning and development' in a much wider perspective, which include but not limited to, the government and businesses. Planning and development are also equally applicable in varieties of industries, education, health, environment, welfare, and research context. Regardless of where it is applied, statistics is versatile enough to provide essential information in an appropriate way in the context of planning and development.

The United Nations Population Fund (UNFPA) emphasizes that information about growth, movements, structures, living conditions, spatial distribution and natural resources of a country's population is vital for relevant policy formulation, planning and implementation, and for monitoring and evaluation. For this reason, collection and analysis of data on population and development-related issues play a fundamental role in policymaking. Over the past two decades, many countries have made demonstrable progress in obtaining such data through censuses, demographic and thematic surveys and administrative registers, such as birth and death recording systems. Yet, much remains to be done to analyses and utilize the data collected in a way that fosters sound, evidence-based policy making.[13]

Interestingly, the word `statistics' has more than one meanings, and hence its use is not unique. In the singular, the word `statistic' means a piece of scientific information (e.g., unemployment rate), which can be used for decision making. It also means any number calculated from the sample data (e.g., sample mean). Technically, a `statistic' is a function of any random sample, and as such is a variable over repeated sampling. As a scientific discipline `statistics' represents a subject that deals with production, analysis, and interpretation of data. Popularly, the word `statistics' is used to mean/represent any rates/ratios/indices or figures that provide collective information about any group of respondents or items.

There are three main activities of statistics: (a) production of data through experimental or observational processes, (b) presentation/analysis of data using graphical and numerical methods, and (c) decision making on the characteristics of populations via estimation and tests. Statistics goes far beyond the simple exploration of data. But only sound statistical methods could produce scientific data that is essential for the validity of any statistical inference. Moreover, it is useful for forecasting and predicting variables of interest from any data generating process. Furthermore, statistical methods are able to identify lurking variables and confounding factors to isolate the treatment effect so that valid conclusions on the cause and effect relationship between variables are possible.

3 STATISTICS – WHY AND WHERE?

We live in a world that is full of uncertainty, variation, and errors of various kinds. Statistics is the subject that has come up with appropriate methods and technique to effectively deal with these undesirable, yet unavoidable, facts of life. Needless to say that the above three facts of life – variation, error and uncertainty are everywhere, and hence the use of statistics is unavoidable. Life becomes more complicated and challenging if the three factors act simultaneously or in combination leading to further complications, and as such demands further sophistication of statistical methods. This obvious and ongoing challenge has helped develop statistics faster than any other scientific discipline in the last several decades. Often statistical methods evolved on the way of solving problems in other disciplines, and later it has found applications in many new areas of modern life.

Statistics is an art as well as a science of making decisions in the face of uncertainty. Decisions based on sound statistical findings are scientific, and hence enhances scientifically valid outcomes. Many statistical methods are based on random samples to protect against personal or environmental biases. Both graphical and numerical statistics reveal the facts that are often otherwise unavailable in the mess of data. The hidden `gold' or `jewel' lurking in the mess of data is revealed/exposed using appropriate statistical methods for the benefit of mankind. It is like scanning of the data to rescue apparently unavailable valuables scattered around us. Statistics puts information in the right perspective so that it is ready to be used in decision making.

Today statistics is widely employed in government, business, and academia. Some people call statistics as a science to make correct decision under uncertainty or to minimize the risk associated with the decision. Others call it as the discipline dealing with data analysis. More recently, statistics is being viewed as a discipline of data science, and hence calling Statisticians as Data Scientists. Another group is calling it as a science of strategies. Many statisticians are well versed/placed to serve in high positions in business and industry due to their essential quantitative skills to make decisions and formulate strategies in the face of uncertainty. It is being extensively used in evidence based decision making in medicine, health care, and social sciences.

We are living in a global information society where the flow of information is ever increasing. Statistics plays a major role in shaping and providing scientific information that are useful in almost every aspect of human life, and beyond. It has successfully made its mark on as diverse areas as from astronomy to administration, from business to biology, from housing to health, from engineering to environment, from commerce to

community, from manufacturing to ministry, from marketing to management, from industry to infrastructure, from politics to policy, from tourism to trade-union, from sports to strategy. Modern decision making, be it for an individual or a business or any national Government or an international agency, is increasingly using statistical methods to improve the quality of information/decision.

Some of the important features of modern statistics are highlighted in the following quotation: "Statistics have a key role to play in opening up government because of the role they play to holding the Government to account. They used to be called the `Government's statistics' – now they will be the public's." Jack Straw.[12]

4 STATISTICS IN HISTORY AND MODERN TIME

The history of statistics is very old, although the world has seen its phenomenal growth in the last half century, partly due to the advent of the high power computing technology, and the ground breaking work of Kolmogorov (1956) on Axioms of Probability that laid the mathematical foundation of statistics.[14] In Genesis, Chapter 3 of the Bible notes God's instructions to Moses for a census of all men (cf The Bible)[1]. The Lord said to Moses in the desert of Sinai, "Take a census of the Levites by ancestral houses and clans, registering every male of a month or more." Moses, therefore, took their census in accordance with the command the Lord had given him.[15]

The Arabic term for statistics is *al-ahsa'* (statistics), and the subject is *ilm al-ahsa'* (the discipline of statistics). The term `al-ahsa' means "to count, enumerate, calculate, compute, reckon." The Qur'an uses the term in many places including chapters/verses at-Talaq 65:1, al-Khaf 18:12, an-Nahl 16:18, Ibrahim 14:34, al-Mujadila 58:6 etc. in its various forms. Al-Kindi [d. 870 AD] was a pioneer in cryptography, and he introduce the idea of maximum likelihood.[16] Interesting to note that Ibn Sina or Avicenna has made tremendous contributions in the area of drug development, which required concurrent control for comparing the effects of several treatments at the same time in a single experiment. This is reviewed by Pocock (1983)[17] in his book and also by Senn (2008) who suggest that the Islamic-Persian scholar Avicenna (980-1037) was an early proponent of the clinical control trail.[18]

"To understand God's thoughts we must study statistics, for these are the measures of His purpose." Florence Nightingale.[12]

Historically, the kings and emperors used demographic statistics for taxation, good security and defence strategies. However the modern use of statistics and its phenomenal development in recent years is almost universal. Since the middle of the last century statistics has flourished rapidly due to its new found applications in dealing with complex social, economic, health, engineering, environment, and climate problems.

Although the widespread use of statistics is a relatively recent phenomenon, the use of the word `statistics' is quite old. According to Wikipedia, "The modern history of statistics can be said to start around 1749 although, over time, there have been changes to the interpretation of the word *statistics*. In early times, the meaning was restricted to information about states."[17] As such, it was called 'the science of the kings', but now, to many, it has become a `king of sciences'. The systematic collection of demographic and

economic data by states started in the 18th century. In the early 19th century, the meaning of `statistics' broadened to include the discipline concerned with the collection, summary, and analysis of data.

The importance of statistics in economic development has been recognized by the Government of Japan via observing 18 October as 'the Statistics Day' every year. This day was fixed on 3 July 1973 by the Cabinet for the purpose of strengthening the national concern and understanding to the importance of statistics and promoting their cooperation in the surveys held by the central and local governments. 18 October is the day when the Japanese Government proclaimed the order to compile its first modernistic statistics, 'Fuken Bussan-hyo' in 1870. The day was converted from the lunar calendar day, 24 September, to the solar calendar day, 18 October.[20] The United Nations Statistical Commission in collaboration of the International Statistical Institute (ISI) celebrated the first World Statistics Day on 20 October 2010 to raise awareness of many achievements of official statistics premised on the core values of service, professionalism, and integrity.[21] The event was celebrated in various ways in over 130 countries. The next World Statistics Day will be celebrated in 2015.

The year 2013 is the International Year of Statistics is being marked by worldwide celebrations to highlight and recognize the remarkable contributions of statistical science. Through the combined energies of organizations worldwide, Statistics 2013 will promote the importance of Statistics to the broader scientific community, business and government data users, the media, policy makers, employers, students, and the general public. The goals of Statistics 2013 are increasing public awareness of the power and impact of Statistics on all aspects of society; nurturing Statistics as a profession, especially among young people; and promoting creativity and development in the sciences of Probability and Statistics.[22]

5. CONTRIBUTIONS OF STATISTICS

Although often forgotten and unrecognized, the fact remains, that Statistics has made many profound contributions to the modern society and scientific breakthroughs. Some of the leading contributions of statistics include introduction and implementation of (1) Census, (2) Survey method – Random Sampling, (3) Design and Analysis of Experiment (cause/effect), (4) Randomized Clinical Trial (RCT), (5) Quality Control (TQM), (6) Central Limit Theorem, (7) Analysis of Variance, (8) Linear and Nonlinear Regression Models, (9) Opinion/Exit Polls (11) Forecasting/Predicting Techniques, (12) Research Methodology, and (13) Risk Assessment and Life Testing methods. Many of them are essential tools for planning and development.

In the academia there are many disciplines that are statistics in disguise or highly dominated by statistical contents including, but not limited to, (1) Actuarial science, (2) Bioinformatics, (3) Biometry, (4) Biostatistics, (5) Climatology, (6) Data Mining, (7) Data Science, (8) Demography, (9) Econometrics, (10) Epidemiology, (11) Environmetrics, (12) Forecasting, (13) Image Processing, (14) (Bio)Informatics, (15) Management Science, (16) Meta-analysis, (17) Quality/Process control, (18) Quantitative Methods, (19) Queuing Methods, (20) Reliability Analysis, (21) Risk Analysis, (22) Research Methods, (23) Survival Analysis, (24) Stochastic Process, and (25) Time Series.

Statistics is used to solve many real life problems which directly contribute to the planning and development. Among the popular applications, it is used to (1) prove the effectiveness of a new drug, (2) assess the effect or impact of air or water pollution on the living creatures, (3) measure the demographic or economic growth, (4) forecast economic outlook or growth of different types of crops and produces, (5) create awareness on national or global issues, (6) judge popularity of a government, party or leader, (7) determine the needs for doctors, engineers and other professionals, (8) plan for traffic flow on roads and highways, (9) analyses contributions of different sectors of the economy on the gross national product, (10) formulate/adopt appropriate population and human development programs, (11) highlight the state of unemployment, (12) estimate the agricultural and natural resources, (13) evaluate performance and efficiency gains of the labour forces, (14) find the consumers' price index, (15) study the performance of stock market, (16) enhance the use of information highway, (17) compare among nations and regions, (18) decide on bank/interest rates, (19) make insurance profitable, (20) evaluate the crime rate, (21) improve the quality of industrial products, (22) settle claims of insurance and pay rise of employees etc.

6. STATISTICS IN PLANNING AND DEVELOPMENT

Long ago, developed nations embraced statistics in the manufacturing industries as a method for achieving high quality manufacturing products, and hence minimize the risk of poor/defective products on the way to maximizing the profit. Total quality management and statistical quality control are very much an integral part of the modern industries. The methods allow timely intervention to make necessary adjustments to the machines to rectify any faults adversely affecting the quality of the products.

Statistical methods could also help determine appropriate warrantee period for manufacturing products to minimize the potential risk of loss for the producer. This helps the planning and development of industries and businesses.

Every Government runs a central statistical organization such as Bureau of Statistics or Central Statistics Office or Department of Statistics. These offices are managed by trained statisticians of diverse specialization. They are responsible for diagnosing the state of health of the national economy, industry, agriculture, trade, education, and medical and health care etc. These offices prepare periodic reports on unemployment rate and consumer price index, two vital indicators of national economy. The annual gross domestic product of a nation is also determined by producing appropriate statistics.

Fiscal management of a nation is also largely dependent on statistics. Central, State, or Reserve banks set interest rate (bank rate) based on statistical data on current state of export/import, consumer spending, currency exchange rate, consumer price index, inflation rate and overall health of the economy. All these have direct impact on the planning and development of any nation.

Politicians use statistics in assessing the popularity of their personal, party or Government position using sample surveys. Decisions on when the Government would go for the election is very much dictated by the outcomes of the opinion polls, often without admitting it in public. So called 'exit poll' is used to forecast the outcome of an

election before counting the votes. Normally, in the democratic nations, government would not call an election if the opinion poll is not strongly in its favour.

7. STATISTICS IN PLANNING AND DEVELOPMENT

For any modern state, planning and development cover a range of sectors such as government, business, industry, research institutions etc. However, the national planning and development of any particular country is likely to have some country specific priorities and characteristics. It is well known that the expatriate wage earners make a huge contribution for the economy of several south Asian countries, and so this sector would have a special focus in those countries. Similarly, population growth and natural disaster management are at the very heart of any planning and development in many developing countries. Another dominant aspect of planning in these countries is the poverty elimination. On the other hand the priorities of planning and development in the developed countries are more to do with unemployment and growth rate, healthcare, environment, social welfare etc.

Every modern state has a national statistics office, in many cases it known as Bureau of Statistics. Such an office is responsible of producing and providing necessary statistical information to the Government and other users of statistics. It has a crucial role to feed in valuable information to determine the national priorities and shape the short term and long term planning. Often the central statistics office has several branches responsible for (1) conducting population, industrial, and economic census; (2) producing statistics on the agriculture sector; (3) gathering demographic and health statistics; (4) preparing national accounts, GDP, GNP, and CPI; (5) handling statistics on industry, and labour force; (6) supporting computer analyses, storage and preservation of data etc.

The relevant government department responsible for planning also engage in a series of statistical endeavours including (1) assessment of statistical requirement for the country in line with international standards, provide general direction to statistical activities, designating statistics collecting agency and authorizing products, (2) conduct periodic censuses on population, agriculture, live-stock establishment and industries, conduct socio-economic and demographic surveys and collect, compile and publish current official statistics on all economic activities, namely agriculture, manufacture, foreign trade, Government statistics, and others, estimate national and social accounts, compile and analyses those statistics and publish reports thereof, (3) coordinate assistance and advice on methods used by various parts of the government in data collection, establish standardization and impartial objectivity in official statistics. This is important for the coordination and streamlining the kind of statistics generated/ collected by any Government agency for national and international use, (4) organize and establish data bank and electronic data processing system (5) administer the Statistics Act and Rules framed thereunder, and (6) promote research and training in statistics, organize and administer unified statistical services.

The *Statistical Yearbook* produced by most of the national statistics office contains data from all sectors of national economy, and is the primary source of valuable information for many users and researchers at home and abroad. Recently the many national statistics offices have undertaken initiatives to prepare National Strategy for the

Development of the Statistics (NSDS). The NSDS is a policy document for the development of statistics, which is claimed to be comprehensive, inclusive, realistic, pragmatic and nationally-owned. The NSDS is a global initiative under the guideline and leadership of PARIS21 in order to help the developing countries improve the performance of their statistical systems.

8. QUALITY OF STATISTICS

The quality of data and statistics are as important as the conclusions made from them. Inappropriate data and method will surely lead to misleading outcomes and adverse consequences. So, it is essential that the collection, compilation, and analysis of data are scientifically valid and comply with the requirements of good practice so that the statistics produced by the data are reliable, accurate, and meet the ethical standard. Only good quality statistics could provide effective decision making framework, evidence based policy making, appropriate design and implementation of national policy, and monitoring and evaluation of effectiveness of plans and programs.

Only the good quality statistics are useful in making correct decisions. The essential characteristics of good statistics must ensure that the statistics meet the needs and expectations of the end-users, it is readily available and accessible, satisfy the breadth and depth of expected coverage, provide reliable information, maintain the relevance, and ensures timeliness and punctuality. To guarantee the quality of data and statistics government statistics office often works under a well set framework to ensure the timely availability of credible and useful statistics. For example, they (1) specify needs for information and its objective, (2) design output variables, collection and processing of data, (3) build data collection instrument, workflows, and test production system, (4) collect data as per the set design, (5) process data integrity, classification, review, edit, and define new variables, (6) analyses draft output, validation, and scrutinize, (7) disseminate output, manage dissemination and user support, (8) archive data and results, and (9) evaluate the process for future improvement.

One of the main tasks of any national statistics office is to earn and maintain the confidence of the users of statistics and general public. Public perception of statistics is a key to the success of official statistics. Keeping the clients satisfied is absolutely essential for the producers of statistics. This is achieved by observing some fundamental principles of official statistics and promoting them. Any government statistics office must (1) retain users' trust using strictly professional considerations for decisions on methodology, terminology and data presentation; (2) establish accountability and transparency by making sources and methods used to compile statistics readily available to users so that they can judge the fitness of use of the data; (3) address erroneous interpretation and preventing misuse of statistics by explaining perceived erroneous interpretation and misuse of statistics; (4) safeguard the confidentiality of individual's data; and (5) strictly adhere to the legislation by following laws, regulations and measures under which the statistical systems operate for public benefit.

For good quality statistics the producers must adhere to the ethical standard of collecting and processing of data, and preparing statistics. This is absolutely essential to gain and maintain public trust and perception of statistics. Independence of statistics

office from all external and government influences and interferences is another factor to produce good quality statistics. In many developed countries there are Statistics Acts to guarantee this crucial status and protect the people in charge of producing statistics. Support and agreement of politicians and decision makers are essential to achieve this goal. Success and effectiveness of statistics largely depend on the practice of high ethical standard and independence of statistics office. Any low or bad quality statistics, and statistics failing to meet the expectations of the users, would bring undue blame on statistics and adversely affect its hard earned credibility. From credibility point of view, no statistics is much better than bad quality or inappropriate, inaccurate and unreliable statistics.

9. FURTHER DEVELOPMENT AND PROMOTION OF STATISTICS

As the world faces with new and complicated problems, researchers require searching for appropriate statistical methods to solve the emerging problems. Many statisticians were converts to the profession from other disciplines on the way of working in various fields of engineering, agriculture, physics etc. In fact, statistics has been, and still is, a necessity-driven subject. Whenever researchers or end-users had/have problems with variation, error or uncertainty they turned to statisticians for help. Increasingly the major problems that the world faces today are becoming more complicated, interlinked and complex requiring discovery of new statistical methods. Multidisciplinary team of experts with diverse knowledge are required to solve these problems. Thus development of statistics is on-going and often stipulated or prompted by experts in other disciplines. This brings more challenges and opportunities to the current and future generation of statisticians. At the same time the development of statistics is not an exclusive task of statisticians, although they should lead the way to meet the increasing demand of the subject and the requirements of the end-users.

In the contemporary world many policy makers, experts, researchers, business executives, stakeholders, end users and members of the civil society use statistics for varieties of reasons. But all of them require statistics that are accurate, reliable and timely. So the statistical agencies producing statistics and providing statistical services require special attention to all segments of the clients and their expectations. Hence the statisticians must take the main share of developing and promoting statistics, and safeguarding its quality, appropriateness and usefulness. Actively working with colleagues and officials from different disciplines and departments would be a good way of promoting the value of statistics and expanding its applications.

The main users of statistics are the policy makers at the government departments, business executives in the private sector, research community, and international agencies. These people should share responsibilities to develop statistics to ensure its appropriateness, accuracy, and expected benefits. All good journalists use statistics to prepare reliable reports on various socio-economic and administrative issues. The value and power of good statistics are well known to them. They play a key role in promoting and popularizing statistics to the public. Thus the media related people should have proper knowledge and understanding of statistics to ensure correct interpretation and avoid its unintentional misuse or abuse. There are many people engaged in the

consultancy business as administrators or experts. These people could directly promote the use and benefits of statistics in industry and business.

To ensure statistical literacy of the future generation of global citizens every nation should introduce formal teaching of statistics in the school and college curricula. Producers and users of statistics should join hands to promote statistics in the wider community through various events and activities. Researchers and research organisations using statistics and working with statisticians could also enhance and popularize statistics through increased public relations and sponsorships.

8. CONCLUDING REMARKS

Most of the statistical methods are generic in nature and can be applied to variables from any discipline, although some of them evolved in the way of solving problems in a specific context. Obviously there are no selected methods dedicated to the planning and development. Methods appropriate to dealing with the variables relevant to planning and development are applied to that end. Statistical methods that are useful for planning and development could very well be appropriate for many other purposes.

Like many other scientific disciplines statistics can be, and often are, misused for various reasons, and by dishonest or ignorant professionals and users. This is not a fault of statistics as a discipline; rather the responsibility lies with the people who deliberately or ignorantly abuse it. Much like a chemical or drug, which can be beneficial to users if applied appropriately, and could be fatal otherwise.

As a continuingly growing subject, statistics is always in search of better methods to improve on the existing ones. The researchers and producers of statistics must be abreast all the time so that the users get the best results possible. This is equally applicable to everyone engaged in providing crucial information for planning and development for public or private institutions.

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