

MATHEMATICS APPLICATIONS FOR EFFECTIVE GOVERNANCE
IN NIGERIA

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Abstract

Mathematics and effective governance mutually reinforce each other and are supportive of economic development. Mathematics provides the Ingredience for planning and policy execution. Effective governance takes into account main indicators such as technical and managerial competence, the quality of a nation's reliability, predictability and the rule of law, accountability, transparency and open information system and participation. For all these qualities to be properly harmonized and implemented, data must be collected analysed and interpreted. There is no doubt then, that effective governance will keep our nation Nigeria true to its identity, vision and values. This paper therefore considered the concept of governance, effective governance, mathematics and its qualities. Qualities of mathematics that may enhance effective governance, the usefulness of mathematics towards effective governance, benefit of effective governance, suggestions and conclusion. Nigerians therefore need to apply mathematics to enhance effective governance for revival of human, material and economic growth.

Nigerians, in the past couple of years have experienced and expressed dissatisfaction over the manner in which their leaders governed them as the nation has witnesses serious corrupt practices, lost of human lives and property, incessant strike actions at all levels of education by teachers, tutors, and lecturers respectively just to mention a few. This paper looked at effective governance and how mathematics as a subject can be used or applied to enhance effective governance in Nigeria such that corruption can be minimized if not totally eradicated, safety of human lives and property ensured, infrastructural and human development become possible and above all transparency and accountability be experienced by citizens.

What is Governance?

According to Undongwo and Ike (2014) governance is a process by which decisions are made and implemented through formal and informal actors. Governance could be in the international, national, local or corporate. From en.wikipedia (2015) governance is all processes of governing whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization or territory and whether through laws, norms, powers or language. It relates to processes of interaction and decision making among the actors involved in a collective problem that lead to the creation, reinforcement or reproduction of social norms and institution. Sheng (2013) posited that the concept of governance is not new, it is as old as human civilization. Governance means the process of decision making and the process by which decisions are implemented or are not implemented. It can be used in several contexts such as; corporate, international, national and local governance. Meyer (2005) noted that, it is all the processes that coordinate and control a nation's resources and actions. Its scope includes ethics, resources, management process, accountability and management control.

Actors involved in governance include:

- i. Government
- ii. Military
- iii. Civil society
- iv. Organized crime syndicates (Sheng, 2013).

This depends on the level of governance. This paper therefore, considers formal governance of a nation (Nigeria) whose actor is the government.

Ugochukwu (2000) defined government as a body of citizens who has the responsibility to run the affairs of a nation. These citizens are expected to leave their source of livelihood and face squarely the affairs of the state. As a result, they are paid for their services. Similarly any group of persons charged with the responsibility of

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managing the affairs of an organization or society is referred to as government. A body of persons, politically organized to govern and administer an autonomous and independent nation could be seen also as government.

What is Effective Governance?

To start with, effective simply means something that works well and produces the results that were intended (Collins Dictionary, 2009). Effective governance is a prerequisite to nation building and national development. According to Akomolede (2012), it is ruling the people well within the tenets of the constitution and other enabling legislations. Effective governance therefore, is all about the processes for making and implementing decisions. It is not just about making correct decisions but about the best possible process for making these decisions and implementing them.

Effective governance is evident through the following characteristics; participation, consensus oriented, accountability, transparency, responsiveness, equitable and inclusiveness, following of rule of law, considering the view of the minorities and the most vulnerable in the society in decision making and responsive to the present and future needs of the society (Akomolede, 2012).

Participation: Participation by both men and women is a key cornerstone of effective governance. It could be either direct or through legitimate intermediate institutions or representatives. Participants need to be informed and organized. This means freedom of association and expression on one hand and an organized civil society on the other hand (Sheng, 2013). Citizens must be provided with easy access to make input into policies and law making process of the government in the wording of the constitution, sovereignty belong to the people and that, the participation by the people in their government is to be ensured (Akomolede, 2012). Mathematics is the tool that empowers leaders to choose a percentage or proportion of people to participate or represent their state, local government, constituency etc decision making and implementation.

Consensus Oriented: As there are so many actors as many view points in a nation, effective governance requires mediation of the different interests in the nation to reach a broad consensus on what is in the best interest of the whole citizen and how this can be achieved. It also requires a broad and long-term perspective on what is needed for sustainable development and how to achieve the goal of such development (Sheng, 2013). It is with the knowledge of mathematics and its application that leaders will assemble and sort out the views and interest of its subjects to reach a wise and suitable decision.

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Accountability: This is the main requirement of effective governance, government has an obligation to report, explain and be answerable for the consequences of decisions it has made on behalf of the citizens it represents. Mathematics is the only subject and language that expresses, explains and understands accountability.

Transparency: This means that decision taken and their enforcement are done in a manner that follows rules and regulations. This means that information is freely available and directly accessible to those who will be affected by such decision and their enforcement. It also means that enough information is provided and that it is provided in easy understandable form and media (Sheng, 2013). Observation of due processes or protocol is characteristic of mathematics that is making and implementing decision in a step wise manner such that every step our leaders take is open and clear to its subjects

Responsiveness: Effective governance requires that institutions and processes should try to serve all stakeholders within a reasonable timeframe and appropriately. Time is a mathematical instrument which guides our leaders' action e.g time to assume office, time to handover, time to start a project and end, time to accomplish set goals/objectives for themselves and their subjects

Equitable and Inclusive: For governance to be effective, government must understand that a nation's well being depends on ensuring that all its citizens feel that they have a stake in it and do not feel excluded from the mainstream of the nation. This demands all groups, but particularly the most vulnerable have opportunities to improve or maintain their well being (Sheng, 2013). Mathematical knowledge and application enables our leaders to detect the state and nature of its citizen so as to be considerate in decision making and implementation.

Rule of Law: Effective governance requires fair legal framework that are enforced impartially. It also requires full protection of human rights particularly those of minorities. Impartial enforcement of laws requires an independent judiciary and an impartial and incorruptible police force (Sheng, 2013). Mathematics is the only subject that deals with impartiality, it gives a right measurement and its objective in sharing of resources. It is a subject that disciplines the mind towards right judgement.

Mathematics and its Qualities

Mathematics is an intellectually stimulating subject that affects every facet of human activity such as politics, economy, science, technology, etc (Abakpa and Iji, 2011). Mathematics is an aid to representing and attempting to resolve problem situation

in all disciplines. It is an interdisciplinary tool, and language (Uoregon.edu/./mathematics.htm). According to Soyemi (2003) mathematics is a subject of everyday application and communication tool per excellence. It is a body of knowledge governed by some rules developing on the basis of particular characteristics and features that the subject is expected to exhibit.

In affirmation, Odili (2006) posited that mathematics is a practical and real life subject with universal applications, one with advantages that cuts across virtually all aspects of human endeavour. It is an incontestable door way and major key for accessing and strengthening all other subject areas and human endeavour. It is a body of knowledge, a collection of techniques and methods. It is the product of human activity and even as the activity itself and the solving of problems.

Mathematics is a subject that reveals hidden patterns that help to understand the world around us now much more than Arithmetic and Geometry. Mathematics today is a diverse discipline that deals with data, measurement and observations from science; with reference, deduction and proof; and with mathematical models of natural phenomena, of human behaviour and social systems. Mathematics relies on logic rather than on observation as a standard of truth, yet employs observation, simulations and even experimentation as a means of discovering truth (www.Math.duke.edui/./Whatmath.htm).

Qualities of Mathematics that may Enhance Effective Governance

Mathematics is a bedrock for Nigerian leaders and citizens to stand on to achieve effective governance, if properly and adequately taught, learnt and applied in various disciplines of life. In affirmation Sidhu (2006) maintained that mathematics is a way to settle in the mind a habit of reasoning well. It trains or disciplines the mind. Due to its very nature, it possesses a real disciplinary value. It is exact, true and to the point of knowledge and therefore, creates a discipline in the mind of individuals. Mathematics education helps moral development and character formation; it helps develop proper moral attitudes as there is no place for prejudiced feelings, biased outlook, doubts and half-truths, discrimination, mal-distribution of resources. There is no impartial judgement, qualities such as honesty, truthfulness, justice, dutifulness, punctuality, self-confidence, discrimination between good and evil, observation of rules and belief in systematic organization and arrangement. The application of these qualities will in no doubt bring about effective governance in Nigeria.

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The national objectives of mathematics education right from the primary school level to the university level of education point towards making its citizens competent in governance. The following are some of the objectives;

- *Inculcation of permanent literacy and numeracy and the ability to communicate effectively.*
- *Character and moral training and the development of sound attitude.*
- *Adapt to changes in the environment.*
- *Raise a generation of people who can think for themselves, respect the views and feelings of others, respect the dignity of labour and appreciate these values specified under our broad national aims and live as good citizens.*
- *Developing the ability to differentiate between relevant and irrelevant judgement through the discrimination of values.*
- *The acquisition of both physical and intellectual skills which will enable individuals to develop into useful members of the community and*
- *The acquisition of an objective view of the local and external environments (Obodo, 2004: 3-5).*

No wonder then, that mathematics education is made compulsory at all levels of education, even students at the university level who would not want to hear the name of mathematics are made to study statistics as a compulsory course so as to enable them to make informed and wise decisions in their projects and others projects entrusted to them.

The Usefulness of Mathematics towards Effective Governance

Mathematics as a subject has five branches viz:

- i. Arithmetic
- ii. Algebra
- iii. Geometry
- iv. Trigonometry
- v. Statistics and Probability

These branches have distinct qualities/characteristics such that when taught, learnt and applied at the right time and place would enhance effective governance. In this paper, we considered arithmetic and statistics application for effective governance.

Arithmetic is the branch of mathematics that deals with numbers, their relationship among them and how to use them to solve problems. It is number oriented and values specific (Soyemi, 2003). Arithmetic enjoys a wide application in governance since it is the bases of all transactions such as computation, negotiation, numeration,

trade and commerce. It is the language or medium of expression for commercial transaction in governance.

The power of numeration keeps the leaders abreast of the number of states, local governments and constituencies in the nation in which they govern such that the views of each state etc in the decision making is well represented and in turn sends information of the decision reached to them within a reasonable timeframe. Arithmetic therefore, enhances transparency, accountability, consensus oriented etc. Key rules of arithmetic that is, the rules of BODMAS and the LAW of PRECEDENCE are a necessity in the process of decision making and implementation in our nation. Orderliness and constructive stepwise approach to issues are a hallmark of arithmetic operations while the law of precedence is the protocol rule which regulates order when several issues occur in the nation in the process of governance. Arithmetic rules of BODMAS and the law of PRECEDENCE guide the government to respect, sustain and uphold at all times, the rule of law and the constitution in decision making processes and implementation such that there is transparency, accountability, participation, responsiveness etc without which no proper decision is taken and implemented.

According to Emaikwu (2012) statistics is a branch of mathematics which deals with the collection, classification analysis and interpretation of numerical data. It deals with quantitative analysis of numerical data so as to engage in precise measurement of resources with a view of deriving maximum satisfaction. Yusuf (2013) stated that statistics is the collection, organization and interpretation of data; it deals with all aspects of this including the planning of data, collection in terms of the design, of survey and experiment.

Statistical knowledge and skills are deployed to monitor activities, it describes the reality of peoples' everyday lives and the picture of the society tells us where they are, why they are poor and what lives are likely and will be in future. This information provides the bases required to develop and monitor development polices which are identified and also highlights where resources are most needed and provides means to track progress and assess the impact of different policies. Good knowledge and application of statistics will improve transparency and accountability of policy making and implementation, both of which are essential for effective governance as it enables electorate to judge the success of government polices and to hold the government to account for those policies. Statistics is also essential for management of effective delivery of basic services and resources and it guides in appraising/critics of government to keep them in check.

Many economic, social, political and military decisions cannot be made without statistical techniques. Statistical knowledge provides crucial guidance in determining what information is reliable and which prediction can be trusted. An example is what happened in the just concluded general election in Nigeria 2015. Arithmetic and statistics provide the bases on which planning, quality control and production stands can be assessed, examined and reviewed for their performance. It helps to identify the bad performance area enabling to rectify the correction in the process of governance.

Benefits of Effective Governance

Effective Governance Promotes National Confidence: People are more likely to have confidence in their nation if decisions are made in transparent and accountable way. This helps people feel that the government will act in the overall interest of the citizens' regardless of differing opinions. It also encourages those in government to remember that they are acting on behalf of their states and nation, which helps them to understand the importance of having open and ethical process which adhere to the law and stand up to scrutiny. National assembly members and other officials will be confident that they are across the issues that, they can trust the advice they give and that their views will be respected even if anyone doesn't agree with them and that the national assembly is a safe place for debate and decision making. They will feel more confident in providing frank and fearless advice which is acknowledged and respected by the house of assembly members.

Effective Governance Leads to Better Decisions: Decisions that are informed by good information and data, by stakeholder's views and by open and honest debates will generally reflect the broad interest of the nation. They will also be less tempted to continue fighting or attempting to overturn the decision. Effective Governance will help the national assembly members to meet their legislative responsibilities if decision making is open and are to be followed by observers. It is more likely that government will comply with relevant legal requirements. They will also be less likely to take shortcut or bend the rules.

Effective Governance Supports Ethical Decision Making: This is because it creates an environment where the elected house of assembly members and representatives ask themselves what is the right thing to do? When making decision, making choice and having to account for them in an open and transparent way, encourages honest consideration of the choice facing those in the governance. This is the case even when differing moral frameworks between individuals mean that the answer to what is the right thing to do is not always the same (www.goodgovernance.org.au/about-goo).

According to Amwine (2002) effective governance keeps a nation true to its identity, vision and values, it motivate workers, volunteers and citizens through exhibiting quality leadership and minimizes the rate of corruption.

Conclusion

It is quite glaring that effective governance cannot exist without mathematics since it is the application of its disciplinary value, moral value, economic value etc that gives birth to transparency, accountability consensus oriented, equitable and inclusiveness etc which will inturn brings about national unity, human and economic development.

Suggestions

Based on what has been discussed in this paper, the writer proffered the following suggestions:

- Effective leadership training should be intensified at all levels of education.
- The objectives of teaching and learning of mathematics right from the primary schools level to the university level should be made known to the pupils/students before and after lessons so as to arouse their interest to achieve the set objectives.
- Teachers should always relate topics they teach to real life situation that is, the application of the content taught to activities around them.
- The characteristics of effective governance should be put in black and white in the offices of our leaders so that they can go through it every day as they go to work to be reminded of the duties they owe their citizens and act accordingly, as the nature of mathematics demands that consistent practice makes perfect.
- Only competent and God fearing trusted persons in character and morals should be appointed or elected as leaders to govern our nation, as mathematics education helps moral development and character formation.
- Corrupt leaders should be sanctioned according to the rule of law and constitution of our nation, since mathematics is a subject of discipline and for every solution to a problem, the rules and laws must be adhered to strictly to obtain correct results.

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