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Significance and Application of Computer-Based Forecasting to Governance and Leadership

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Abstract: Forecast results, products and applications are crucial in different sectors of a nations's economy. Areas such as health, social, political, commerce and infact overall economy require the use of forecast techniques; but, success in governance and leadership seem to depend majorly on proper use of efficient forecasting techniques. This study focuses on the significance and application of computer-based forecasting in governance and leadership generally. The research being a descriptive type uses data from primary sources (observation, oral interview) and secondary sources (online publication) to locate, collect, analyze and summarize opinions on the significance and applications of computer-based forecasts to governance and leadership concerns. The work revealed that poor forecasting in governance leads to uninformed decision making manifested in poor service delivery, high project cost, insuficient amenities and overall below average performance of leadership. The effect of this on stakeholders is enormous. Tax-payers face untold hardship and lack of basic amenities. Governments waste resources on wrongly chosen projects and communities loss confidence and interest in the government. Consequently, the governance becomes unpopular and leadership fails. The application of computer-based forecasting provides a solution to these economic ills.

Keywords: Forecasting, Computer-Based Forecasting, Application software, Forecasting in Governance, Forecasting in Leadership, Governance, Leadership.

1.0 INTRODUCTION

Forecasting cum planning form the basis for rationale decision making. Development of accurate and reliable forecast requires hence necessitates the knowledge of the *methods* and *ability* to analyze and evaluate the changing conditions in micro- and macro- environment in which governance cum leadership operates. Governance is a point where management of resources, administration of policies and leadership of people intersect (Ihezuo, 2016:p.214). While governance is sub-leadership, management is a sub-economy [Ihezuo, 2016]. Forecasting is great tool in management of resources and it keeps coming up in economic indices. Evolution and skillful use of correct forecast is the basis for making optimum unexaggerated decisions in managing resources. Put inversely, the *goal* of forecasting is to provide possible most objective and substantial prerequisites "informed/educated guess" for decision-making and analysis of many facts that may involve governance as the case may be in this topic: *Significance and Application of computer Based Forecasting to Governance cum Leadership*. The need for forecast is *inherent* in any system for organization. For instance, governance is set to organize and govern the people to achieve a desired goal (Ihezuo, 2016:p.214). Many things are involved! But just for instance, every year, every governance system be it corporate or public make annual forecast of revenue and expenditure for the expected incomes and expenditures [recurrent and capital] for their organization technically called annual *budget*. It, as an estimate as the name implies is best a forecast, an estimate and prediction … a guess of what should be gotten and what should be spent. They are arrived at quantitatively [measurable, hence programmable – computer-based] and qualitatively [non measurable, intuitive, gut and judgmental]. "Forecast is based on predicting thus *inferring about the unknown event based on the already known events*" (Cieślak, 2011:p.18). The *aim* of forecast in any organization or society is to provide data cum information about current estimates and future changes and impacts these changes can bear on actuality.

Motivation:

The concern for finding reason hence solution for failed/abandoned projects, deficit in budget appropriation, wrong population census estimates and its adjustments, amenities and developments distributions were strong motivation for this work. These decisions failed because the information required to generate the right decision are wrongly reached. Note, information is a processed data. The act of processing these data can take different nature. In forecasting world, most decisions are arrived at subjective and by mere guesswork: qualitative techniques. This is seen by high mortality rate of those decisions. An objective technique needs examined to study their significance and application in forecasting.

Aim & Objectives

The aim of the study is to exegetically explore the significance and application of Computer-Based Forecasting in governance.

The specific objectives are to know the place of Computer-Based in terms of values, usefulness and applications as contrasted from other forecasting techniques.

The study focuses more on the public and corporate administration which are the objects of governance. But

underlying in any group is "governance" [Ihezuo, 2016:pp.280]. It can be good or bad. No government can lay claim to good governance if decisions affecting the people are not reached objectively but judgmentally [subjective] making the people to wallow in poverty and underdevelopment. People want to **belief** [have confidence in] the process for reaching their life decision to be unbiased. This is so because according to Ihezuo (2016:281), governance is defined as ***the process of decision-making and the process by which decisions are implemented or not implemented***. It is an intersection crossing the two parallel lines of management and leadership.

The essential component of this forecast system is *collection*, *selection* and *analysis* of *internal* and *external* data mostly *historical*, which should meet a number of formal criteria such as *availability*, *completeness* and *comparability*.

2.0 REVIEW OF LITERATURE

2.1 Forecasting Defined

According to onlineDictionary.com forecasting literally means to predict or estimate a future event or trend. Forecasting is a judgment of the likelihood of a particular event at the time defined with the accuracy of a moment (point) or a period (range) of time in the future (Cieślak, 2001). The online dictionary (Wikipedia.org) defines forecasting is the process of making predictions of the future based on the past and present data and most commonly by analysis of trends. It says prediction is similar but more general term. The business dictionary (www.BusinessDictionary.com) sees forecasting as a planning tool that helps management in its attempts to cope with the uncertainty of the future, relying mainly on data from the past and present and analysis of trends. More still, investopedia (www.Investopedia.com) stated the forecasting refers to uses of historic data to determine the direction of future trends.

Forecasting according to BusinessDictionary.com starts with certain assumptions based on the management's experience, knowledge and judgment. The appropriate forecasting method depends largely on what data are available. This judgment characteristically should;

- ≈ Be formulated using achievement of *modern science*
- ≈ Relate to a *predefined future* not endless future
- ≈ Be *empirically verifiable* even when judgmental.

2.2 Forecasting Techniques versus Forecasting Systems

A forecasting technique or method is a mathematical equations that forecasts some future value or event. While many statistical forecasting user-programs or software packages are implementations of forecasting methods. A forecasting system is said to be a computer-based system if that system collects and processes demand data for thousands of items (iteratively), develops forecasts using forecasting methods, has an interactive administrative and management user interface, maintains a database of demands, and has report file-writing capabilities [Kurzak, 2012]. This is the crux of this research: Significance and Application of Computer-Based forecasting…

A forecasting system is much more complex than a forecasting technique. For this reason, this study dwells on forecasting systems. *Computer-based* forecasting system is just one example of theses forecasting systems. Of course, the forecasting method is a part of the forecasting system (CFO Research Service, 2009). Computer-Based forecasting system incorporates forecasting techniques such as regression analysis, curve fitting, evaluation of closeness to a fit, moving averages (simple, exponential and weighted) and seasonal adjustments.

2.2.1 Theory Of Forecasting

Essential part of managing enterprises is to forecast future events or occurrences which is, technically called forecasting (Lucian, 2012:pp.176). Please note that governance is a form of enterprise, a form of project and a form of organization (Ihezuo, 2016). These three; enterprise, governance and organization involve coming together of two or more people organized in a specific form for a goal. It is Robbins & Judge (2014:pp.39) that define organization *as a consciously coordinated social unit, composed of two or more people, that functions on a relatively continuous basis to achieve a common goal or a set of goals*. So, no decision can worth a pinch of salt without accurate and precise forecasts as they primarily concern the enterprise's, organization's and government's future. Hence, the causes for development of forecasts are:

- ⇘ uncertainty even in environment
- ⇘ delay in time between the moment when the decision is made and its effects.
- ⇘ conditions of certainty i.e. knowledge of the enterprise's environment,
- ⇘ conditions of risk, when the likelihood of possible variants in the environment state is known,
- ⇘ conditions of uncertainty i.e. lack of knowledge of the likelihood of the possible variants of the environment state
- ⇘ conditions of incomplete information, which are connected with the lack of knowledge of all the possible variants of the environment state.

The environment [often called macro-environment generally] in this case is regarded to be *'a set of external factors, directly or indirectly affecting the operations in this case governance*'. The Figure [Fig. 1) below shows

the macro environment of governance in which forecast can be deployed and the associated factors affecting the environment hence the variables the computer-based programme will take into consideration. Forecasting the future means pointing to the future goals, means and

methods of operation in order to achieve the forecast objectives.

When forecasting, one should not neglect current theories. Formal models of individual processes that occur in a deliverables should correspond to the theoretical assumptions which are connected with governance processes. Proper forecasts can be obtained only if a model that corresponds to theoretical assumptions is developed as in Fig. 2.

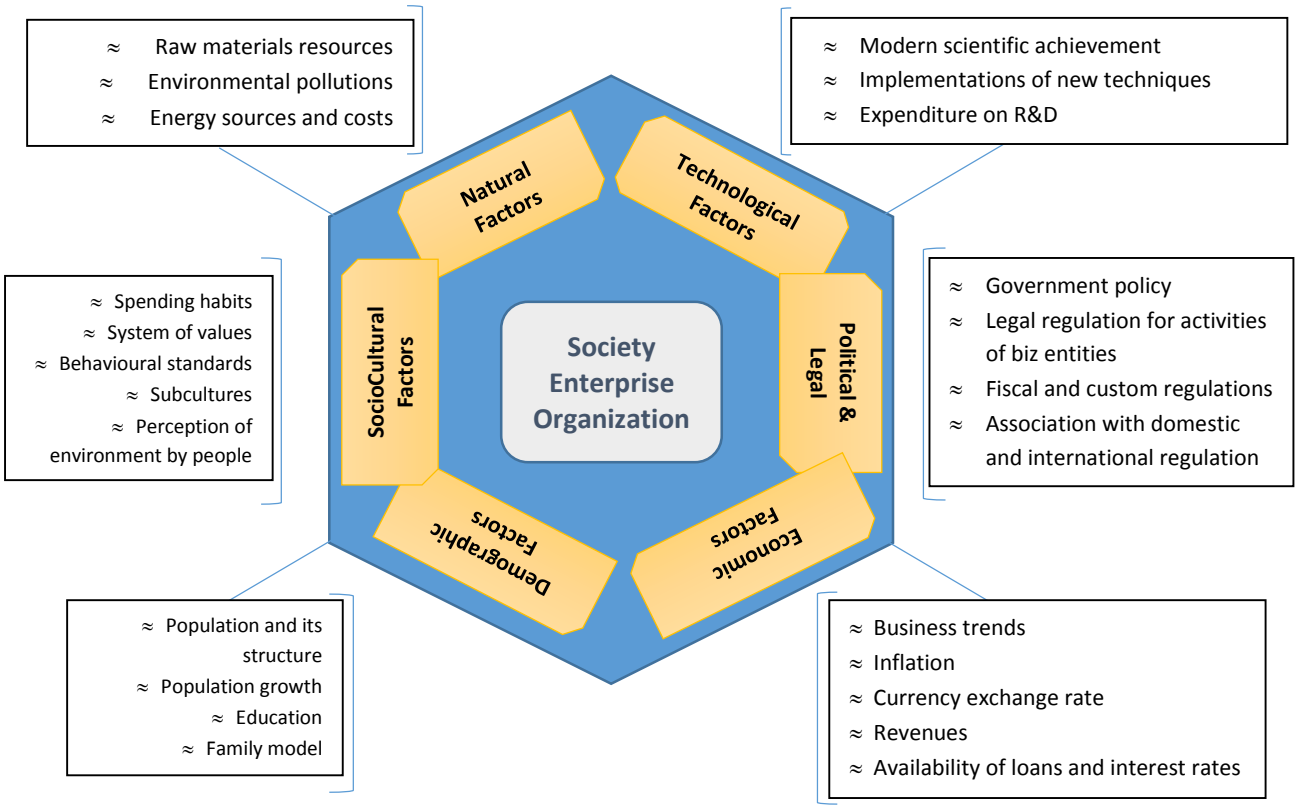

Figure 1: Components of Macro Environment [society, Organization, Enterprise]

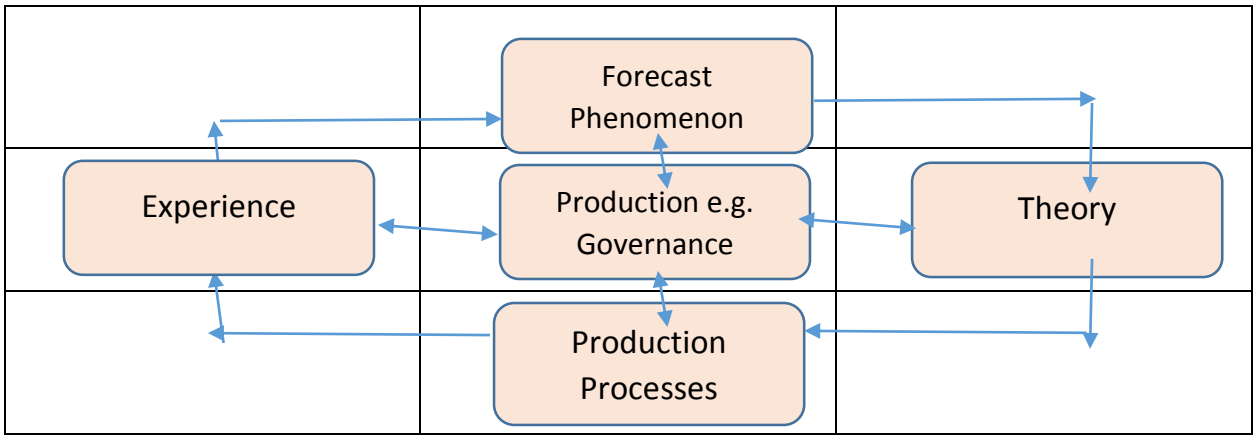

Figure 2: Using Theory in Forecasting

2.2 Data Angles of Forecasting

These are the two data angles of studying forecasting; these include qualitative and quantitative angles.

a. **Qualitative:** Qualitative data allows for *describing patterns* and *importance* of *factors* affecting particular events. It is subjective judgment of expert. Examples of tools here are Delphi, decision tree and Monte Carlo. It depends on conscious creation of past and on the ability of a forecaster to order and associate particular pieces of information. Qualitative methods use qualitative data. These methods are not objective, analytic and sensible especially at short-term forecasts when compared with the other method yet-to-explain.

b. Quantitative: Quantitative data are incidentally basis for analysis of phenomenon and processes of economy. These forecast uses mathematical, statistical, econometrics and optimization models. The condition for using it is availability of (historical) data. This technique is mostly referred as computer-based forecasting.

Whether quantitative or qualitative, forecasting models can be categorized into *time-series*, *causal* and *judgmental* forecasts. These categories are described in the summary box shown in figure 2.

Summary Box: Quantitative and Qualitative Techniques of Forecasting

Quantitative Forecasting Techniques:

- ≈ *Regression Analysis*: statically relates sales to one or more explanatory (independent) variables. Explanatory variables may be marketing decisions (price changes, for instance), competitive information, economic data, or any other variable related to sales.
- ≈ *Exponential Smoothing* makes an exponentially smoothed weighted average of past sales, trends, and seasonality to derive a forecast.
- ≈ *Moving Average* takes an average of a specified number of past observations to make a forecast. As new observations become available, they are used in the forecast and the oldest observations are dropped.
- ≈ *Box-Jenkins* uses the auto correlative structure of sales data to develop an autoregressive moving average forecast from past sales and forecast errors.
- ≈ *Trend Line Analysis* fits a line to the sales data by minimizing the squared error between the line and actual past sales values. This line is then projected into the future as the forecast.
- ≈ *Decomposition* breaks the sales data into seasonal, cyclical, trend and noise components and projects each into the future.
- ≈ *Straight-Line Projection* is a visual extrapolation of the past data, which is projected into the future as the forecast.
- ≈ *Life-Cycle Analysis* bases the forecast upon whether the product is judged to be in the introduction, growth, maturity, or decline stage of the life cycle.
- ≈ *Simulation* uses the computer to model the forces, which affect sales: customers, marketing plans, competitors, flow of goods, etc. The simulation model is a mathematical replication of the actual corporation.
- ≈ *Expert Systems* use the knowledge of one or more forecasting experts to develop decision rules to arrive at a forecast.
- ≈ *Neural Networks* look for patterns in previous history of sales and explanatory data to uncover relationships. These relationships are used to produce the forecast.

Qualitative Forecasting Techniques

- ≈ *Jury of Executive Opinion* consists of combining top executives' views concerning future sales.
- ≈ *Sales Force Composite* combines the individual forecasts of salespeople.
- ≈ *Customer Expectations (Customer Surveys)* use customers' expectations as the basis for the forecast. The data are typically gathered by a customer survey by the sales force.
- ≈ *Delphi Model* is similar to jury of executive opinion in taking advantage of the wisdom of experts. However, it has the additional advantage of anonymity among participants.
- ≈ *Naïve Model* assumes that the next period will be identical to the present. The forecast is based on the most recent observation of data.

2.3 Computer-Based Forecasting

Two major advantages of modern computers are *incredibly high speed* and *great accuracy* with which they can do calculations. Hence, any forecasting method can be programmed to run on a computer for this high speed and great accuracy gains. Even the most calculation-intensive methods can be run on micro-computer within a few minutes.

Finally, the whole model is put together and run as a *system of equations*. In typical small models there may be one or two dozen equations. Today, large systems forecast from a few hundred to tens of thousands variables.

After specifying the exogenous and policy variables (such as population, government spending and tax rates, monetary policy, etc.), the system of simultaneous equations can project important economic variables into the future.

2.3.1 Important Characteristics Which Determine Forecasting Methods

The six (6) important characteristics or dimensions of planning and decision-making which determine the choice of forecasting methods are the following:

1. **Time Horizon:** The period of time for which the decision is made will have an impact. It may be the immediate term (i.e., less than one month), short-term (up to 3 months), medium-term (up to-2 years) long-term (more than 2 years).

2. **Level of Details:** While selecting a forecasting method for a particular situation, one must know the level of details which will be needed for the forecast to be useful for decision-making purposes. The need for detailed information varies from situation to situation and time to time.

3. **The Number of Variables:** The number of variables to forecast affects the need for detail which, its turn, determines the choice of appropriate methods even in the same situation. When forecast is to be made for a single variable, the procedures used can be more detailed and complex than when forecasts are made for a number of variables.

4. **Constancy**: Forecasting a situation which does not change is different from forecasting a situation which is fairly unstable (i.e., a situation which often keeps on changing).

5. **Control Vs Planning:** The controlling function is performed by using a new technique called Management By Exception [MBO]. Any forecasting method must be sufficiently flexible so that the changes in the basic patterns of behaviour of variables or relationships among them can be detected at an early stage.

6. **Existing Planning Procedures:** For introducing new forecasting methods, often the existing planning and decision-making procedures have to be changed. Moreover, in case of any deviation from a set path it gives early warning and the managers face human resistance to such changes.

2.3.2 Examples of Computer-Based Systems for Handling Multiple Quantitative Forecasting: SIBYL & Others

A single forecasting method may not be suitable for all purposes and appropriate for all situations hence it is better to have separate computer programme [computer-based forecasting] for different methods similar to Holt's method. Additionally to this, there must be an overall control programme with a "*menu*" of alternative methods, to check the results of various methods and take corrective actions.

Various computer-based forecasting systems have been developed of which SIBYL1 is most useful and is used in most universities settings and business organizations.

The SIBYL-forecasting system is a philosophy for methodical forecasting and a computerized package of programme. These deal with simple applications at first and go into difficult problems thereafter. The SIBYL system provides software programme for dealing with the following four essential forecasting functions:

- ≈ Data preparation and handling of data.
- ≈ Screening of existing forecasting methods.
- ≈ Application of the methods chosen.
- ≈ Comparison, selection and combination of forecasts.

Item #1 deals with preparation of data files; data entry, data updating, transformation of data programmes and graphing.

Item #2 deals with selection of an appropriate forecasting technique for a particular purpose. This is done in the SIBYL programme. The user is given a list of methods which are suitable for a given situation and a summary of the characteristics of the given situation.

Item #3 deals with the application of the method chosen to the specific forecasting situation; the SIBYL package has 24 computerized subroutines of the most commonly used univariate and multivariate time-series and multiple regression techniques.

Item #4 deals with preparing and combining results obtained from alternative forecasting methods. Individual techniques are applied to a given situation and the results are automatically stored in the memory and recalled at the end of the programme. Thus computer-based system helps us to locate the best method for obtaining the most satisfactory results.

[11] New versions and batch versions are available which can be run on most large (main frame) computers, major time-sharing networks, mini computers and microcomputers like IBM and APPLE machines.

Others such as IBM SPSS, MatLab, Microsoft Excel, etc are available.

2.3.3 Weaknesses of Non Computer-Based Forecasting

The following are identified forecasting weaknesses for non-computer-based forecasting.

1. At project and programme level:

Poor Forecasts;

- ≈ often lack ranges and sensitivity analysis; without this information, decision-makers cannot manage risks effectively.
- ≈ as a result have led to poor value-for-money decisions.

2. At the aggregate level:

Poor forecast is;

- ≈ a result meant for opportunities to spend on worthwhile projects were missed.
- ≈ several root causes for government departments' poor production and use of forecasts
- ≈ implying governments make rapid allocation decisions to meet end of-year pressures
- ≈ able to erode confidence in forecasts generally. They can if consistently done:
    - authorized unplanned spending to utilize underspends;
    - offset overspends in one programme with underspends elsewhere;
    - carried forward underspends; and
    - be unable to reallocate underspends because these were declared too late.

2.3.4. Impacts/Implications of Poor Forecasts

Poor forecasting can cause avoidable differences between expectations and outcomes such as:

- ≈ Private sectors: poor forecasting can lead to lost market share, lower profits or even bankruptcy.
- ≈ Governance: poor forecasting can mean ill-informed decisions and taxpayers bearing the costs and poor delivery of services.
- ≈ Governance: poor forecast means that projects cost more, are completed later or produce fewer benefits than predicted, over/underspends can mean that opportunities to spend on worthwhile projects are missed.
- ≈ Governance: poor forecasting on one project can affect other projects in governments' spending portfolios, as budgets are varied to accommodate unexpected changes.

2.3.5. Major Important Factors To Considered In Computer-Based Forecasting

To deal with weaknesses of forecasting, it is important to consider these six factors;

1. **Time Horizon**: Two aspects of the time horizon are related to most forecasting methods and they are the span of time in future for which different methods are appropriate and that the number periods for which a forecast is required.
2. **Data Pattern**: For matching forecasting methods with the existing pattern of data (i.e., seasonal/cyclical, time-series/cross section etc.) an appropriate method is possible to be selected.
3. **Accuracy**: Forecasts must be as accurate as possible within the limit of human error.
4. **Cost**: In any forecasting procedure the following four costs are generally involved:
    - ≈ Development;
    - ≈ Data preparation;
    - ≈ Actual operation; and
    - ≈ Cost of foregone opportunity.
5. **Reliability**: Never forecast anything based on data which is not reliable for the purpose of decision making.
6. **Availability** of computer software: It is not that easy to apply any given quantitative forecasting method without an appropriate computer programme. Programmes must be "free" from major "bugs", well documented and easy to use, for getting satisfactory results.

2.4 Brief History of Forecasting

Prior to 1950s, there existed hardly any method for business forecasting talk less of computer-based forecasting or introduction of computers into forecasting. In the mid-1950s, light came: exponential smoothing technique was first used by the defense personnel for forecasting purposes. Subsequently, this technique was applied to business organizations beyond defense organization.

In the 1960s, the computer power became cheaper and techniques like multiple regression and econometric models were widely used to quantify and test economic theory with statistical data. As economics entered the age of computers in the 1970's the process was hastened by the availability of cheap computers.

In 1976, the Box-Jenkins method was developed. It is a systematic procedure for analyzing time series data. In truth, the Box-Jenkins approach to time-series forecasting was as accurate as the econometric models and methods.

In the 1960s and 1970s, technological forecasting methods were developed of which the Delphi method and cross-impact matrices were very popular.

However, in 1970s, it was first realized that forecasts were useless unless they were applied for planning and decision-making purposes.

3.0 METHODOLOGY & DESIGN

Main sources of data for *Significance and Application of computer Based Forecasting to Governance cum*

Leadership are both primary and secondary data. The primary source is interview and observation while the secondary source comprises of literature via textbooks and internet access and published reports. [See References.]. Few people knowledgeable and involved with government budgets, projects, planning and developmental and amenities distribution and executions were interviewed. The researcher observed these activities intensively in spite of the previous knowhow of the observation long ago. Similar interview and observations were extended to corporate organization where corporate governance is practiced. Literatures cum publications were used to support the primary data and to bring out the underlying principles therein. Next Section 4.0 will show that.

4.0 DISCUSSION

4.1 Significance of Computer-Based Forecasting to Governance cum Leadership

Effective forecasting for governance requires governance and administrations to recognize that forecasts are more than a technical activity, and emphasize their importance to financial and operational management of economy and governance. It is essential that government ministries, agencies and departments generate cooperation and understanding between the analysts who are involved in the production of forecasts, and their policy, operational and finance colleagues who use them to manage the business of governance [CFO Research Services, 2009]. Often, we identify problems with project-level forecasting, but these latest developments mean this is a good time to consider government forecasting holistically. But the only thing that can make this paradigm right is to make it system-based or computer-based. The significance are;

1. The computer system provides daily global exposure reports [a forecast], facilitating centralized exposure management, aggressive leading and lagging strategies and substantial savings on holding costs each year – a very impossible chore without a computer.
2. In today's highly competitive business world, firms strive to increase productivity and slash costs, in fact, a growing number of companies are instituting austerity programmes to cut layers of corporate management, especially on the international side - computers play a critical role in this effort.
3. By automating finance [forecast with computers inclusive], firms can reduce labour costs, and dramatically improve the speed and accuracy of many routine tasks.
4. Forecasting is an essential component of good financial management and informed decision-making. By the way, effective financial management [only through C-Based] is vital for sound decision-making, accountability, planning and managing risks.
5. Computer-based forecast in addition to putting in place the right processes and culture to support Quality Assurance can *forestall* high-profile ERRORS & or create an atmosphere/abating of FRAUD which can led to unforeseen costs and suspicion to taxpayers and crime hence prompting greater focus on quality and accuracy.
6. Poor forecasting is a *DEEP-ROOTED* problem, leading to poor value for money and taxpayers bearing the costs – which couldn't be with computer-based forecasting.
7. Poor forecasts of aggregated expenditure can lead to late identification of under/over-spending and rapid, poor value-for-money responses; other systems that cannot be as reliable as computer-based can promote this challenge.
8. Demonstrating excellent financial management – including accurate aggregate spending forecasts cannot be entirely judgmental but sound analytical and technical application of only computer-based forecasting can provide via programming.
9. In computer-based forecasting, changes to the budgetary system to encourage earlier and more transparent forecasting of future can easily be incorporated via the mathematical models and programming logics.
10. Governments use forecasts to consider new investment as well as whether existing initiatives need to be changed, terminated or resourced from elsewhere. Nowadays computer-based forecasts include projected:

    i. costs, such as the capital expense of building and maintaining a large infrastructure project;
    ii. demand for services;
    iii. staff resources to deliver a service; and
    iv. revenue receipts.

11. Robust computer-based forecasts of future demand and costs are an essential element of the financial management needed to plan and prioritize services effectively for the governed.
12. The need for accurate forecasting made possible by computer technology has increased with the difficult economic climate and cuts to government spending.
13. Forecast especially reliable and accurate one that can be facilitated by computers can help staff at all levels of an organization understand what is expected to occur and the range of uncertainty to inform planning and risk management.
14. Forecasts can reflect simple trend extrapolations, but ideally involve computer-based modelling and more complex quantitative analysis.

4.2 Applications of Computer-Based Forecasting to Governance and Leadership

Severally computer-based forecasting is deployed virtually in all areas of economic decision-making, statistics, accounting, management, marketing, etc. This researcher discussed few of the application areas here.

1. **Population:** population forecasting are achieved through computer-based forecast. Head count popularly called CENSUS done in developing nations are not yearly but periodically for instance once in 10years in Nigeria is continued as projection based on population growth rate factor. Same is where census is not done but registering of birth and death. Computer-based forecast is used to know the growth factor and number. These exercises would have been helpless if there is no computer-based forecast.
2. **Budget Appropriation:** annual national expected income and spending of government to the society is a forecast based on expected growth and development rate expected to achieve in the coming fiscal year. This estimate projects into the future expected income to make and expected expenditure. 100% full deployment of forecast can help governance.
3. **Developmental Projects:** distribution of developmental projects can use computer-based forecast to remove biases and arbitrariness in its modus operandi when distributing projects. The Computer-Based forecast model and or database should be able to know places that have received government projects and areas that remains to receive so that not some localities receive and others denied.
4. **Decision Support System [DSS]:** there is support for using Decision Support Systems (DSS) with the following issues addressed: techniques within the DSS, corporation needs and limitations, the forecast cost effectiveness, and the appropriate software system.
5. **Distribution of Amenities:** similar to projects computer-based forecasting is a strong tool that government that want to deploy e-governance use in distributing, knowing where to distribute and know where to focus government services and amenities. A typical DSS or a database system can be developed for this purpose.
6. **Sales**: Sales forecasting is an integral part of marketing DSS. The DSS contains tools to help the forecaster prepare better forecasts; tools are data, records of previous forecasting, and techniques. Sales forecast application can also be on standalone.
7. **Marketing**: Computer-based forecasts assist marketing managers improve decision-making.
8. **Organizational Design:** here, forecasting should not be regarded as a self-contained activity, but should be integrated within the planning context of which it is a part. In large matrix organization, accurate forecast can be a major success to OD.
9. **Planning**: this researcher believes that forecasting and planning functions should be combined largely. Involvement of the forecasters in planning enables them to select criteria for evaluating forecasting methods that are meaningful within the planning context.
10. **Operators' Expenses [Imprest] & DSS:** authors Rubinstein & Liddle (1997) stressed that restaurant operators must go beyond the typical spreadsheet software that only allows for tallying of operator expenses and does not include the technology of a DSS.
11. **Production Requirements:** Many software packages are available to restaurant operators that incorporate inventory management, purchasing and sales data, this assist restaurant operators in forecasting sales and production requirements.
12. **Supply Chain Management:** one means of an automated system in supply chain management in the restaurant industry is electronic data interchange (EDI). EDI is the computer-to-computer exchange of business transactions between companies. EDI is seen as a means to facilitate sales forecasting efforts by providing information that would pertain to a channel member's demand for the products and/or services offered by the supply channel member. In turn, the supply channel member, upon receiving this information, would respond with an update to production and/or distribution schedules in order to meet this demand.
13. **Customers Services [via POS]:** the POS [another system to manage sales forecasting in restaurants] system operates on the property level, with the capacity to be interfaced with regional and corporate systems to provide efficiency in the collection and transfer of sales data, inventory management, recipe maintenance, payroll, and many other functions. Hand-held server terminals, which are actually POS systems, allow servers to accurately enter orders that are linked to restaurant databases containing inventory and sales information. Nowadays, this technology in hardware and software is increasing customer service while decreasing inaccuracies in restaurant forecasting.

5.0 RECOMMENDATIONS AND CONCLUSION

5.1 Recommendations

The following recommendations are therefore made to authorities in respect of understanding the importance and applications of computer-based forecasting, helping them to deploy it;

1. Decision-makers need greater understanding of forecasts to provide effective challenge and manage risks.

2. When decision-makers need to introduce new interventions quickly they sometimes fail to recognize and manage the risks their non-computer-based forecasting creates for the quality of forecasts. This ought not to be so.

3. Effective forecasting for governance requires governments and administrations to recognize that forecasts are more than a technical activity, and emphasize their importance to financial and operational management of economy and governance.

4. 'Optimism bias' is a significant problem, with analysts concerned about the pressure to provide supportive which are subjective rather than realistic objective forecasts.

5.2. Good Practice In Forecasting: The Way Forward

The processes of producing and using forecasts must be well integrated, with shared understanding between all parties and capability to produce and use forecasts at project, programme and aggregate levels in order to drive effective decision-making and value for money for the taxpayer. Publics and organizations need the right incentives to maximize the benefits of forecasting. This requires a supportive environment within government ministry and across government, which promotes good practice and ensures accountability. Setting out our good practice framework for maximizing the benefits of forecasts as a leadership tool:

- ≈ When ***PRODUCING*** forecasts, high-quality data, skilled staff, well-reasoned assumptions and clear presentation of uncertainty are required.

- ≈ When ***USING*** forecasts, decision-makers need to understand the level of risk and uncertainty and the reasons behind this, to make informed decisions on how to allocate resources to deliver services on time and budget.

5.2 Conclusions

Today we all recognize the transformation that computers have wrought in the society, workplace and in our lives. In just few decades since the microcomputers brought new power to our desktops and workbenches, the changes have been stunning. A close look at public and corporate governance simply reveals that with information now moving from society to government house and from the factory floor to the company board at blinding speed, whole long layers of corporate management have been rendered obsolete.

People have now learned that the speed of today's more competitive environment does not leave time for dithering over decision, anyway. The resulting learner style has thinned management ranks while encouraging initiative and giving people more responsibility.

Like any powerful technology or invention, the computer leaves little room for sentiment. It has spawned an Information Revolution that promises even more profound changes that we have witnessed already. There can be no doubt that these changes, like those of the Industrial Revolution, will, on balance, provide great benefits.

The digital tide has already reshaped the business and governance world. Now it's spilling out of the office to touch every aspect of our lives. Today's software lets computers simulate workings of machines that don't exist yet. The traditional self-contained computer is merging into the collective identity of the network.

However, predicting the computer's effects seems perilous. As the most symbolic of all tools, it can be just about anything we programme it to be—a telephone switch, calculator, missile guidance system, or fantasy environment. That malleability is what stirs the imagination so strongly.

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