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A Review of the Importance of Business Mathematics to Secretarial Studies in Nigerian Higher Institutions in the 21st Century



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Abstract

In the literature of mathematics studies for business decisions, a variety of terms are used for business mathematics such as management mathematics, operations research, analytical techniques, quantitative techniques (Quant), basic mathematics and management sciences. Irrespective of the terminology used, it is important to realize that the same group of techniques is being described and the same approach employed. This paper is designed to examine importance of business mathematics to secretarial studies in particular, and by extension, to first year tertiary students' mathematics knowledge in non-mathematics majors in Nigerian higher institutions, in general. The paper will apply, in the main, both descriptive and exploratory analysis to review a body of related past literature on the topic under discourse as they relate to teaching and studying basic mathematics in Nigerian tertiary schools and application in business and secretarial professions, in the 21st Century world. Discoveries from the study are:

- A. That laying a solid foundation in mathematics knowledge at lower levels of education would foster an easy ride in one's career in later years in life,
- B. That a trained secretary (like in any other profession) is better than a "copy typist" on the job because he/she understands basic mathematics in business dealings, and
- C. That good knowledge of business mathematics, operations research and computer science assist business operators to master specialized areas which help the organization deal with allocation and planning in complex situations involving limited human and material resources like conducting national elections, going to the moon, conducting population census, etc. Based on the findings of the paper the followings are recommended for policy action: (1) trained secretaries with good knowledge of business mathematics should be encouraged and produced in larger numbers than just "copy typists" in a bid to get adequate number of these professionals in the workplace to lead to rise in productivity of the Nigerian worker (2) Government and other policy makers should strongly pursue policies targeted at enhancing functional education that advocates teaching and studying of basic mathematics at primary, secondary and higher institution levels so as to lay a solid foundation for our future graduates, business practitioners and government leaders. And finally (3), to install a functional education policy that incorporates good preparation and teaching of basic mathematics at all levels of education towards preparing students entering the 21st century universities. **JEL Classification:** H10, H11, C6, D03, C7

Keywords: Mathematics studies; business mathematics; Management mathematics; Operation research; Analytical techniques; Basic mathematics; Management sciences; Functional education policy

Introduction

Most often, first year students of business studies (secretarial studies inclusive), in particular, in their first lectures on business mathematics (or basic mathematics, BM) do wonder why they should at all engage themselves in the study of this regress

mind bugging subject, instead of concentrating on their main subjects: shorthand, typing, office practices or office duties and the likes [1]. Similar experiences, excuses, and complaints are witnessed among first year students' mathematical knowledge,

in non-mathematics majors such as accounting, banking and finance, marketing, medicine, education, physical and non-physical sciences, at their first year in the university, to extend our discourse to other higher tertiary education studies. Mathematics transcends all endeavours of man, and they cannot help applying simple arithmetic comprising additions and subtractions, multiplications and division, to say the least [1,2].

However, the student in a mathematics sciences class get disgusted at the onset especially when he or she starts being introduced to those topics in algebra, calculus or coordinate geometry such as integration and differentiation, factors and factorization, integrals and nominal, simple and compound interests, harder menstruation, pure mathematics, finite and infinite series, circular functions, numerical trigonometry, and others, to say the least, most of which he or she had hated to hear being mentioned during his secondary school days [2-4]. And having managed to secure an admission into a university, most probably through a preliminary (Prelim) concessionary offer only to be confronted again with this “monster” of a subject called mathematics by whatever name, may indeed be most frustrating, to state the fact! The pitiable student gets disappointed at its first mentioning. Though hate he must Business Mathematics, he has got to brace up to face it squarely since he has to pass it in order to progress in his studies to enable him obtain his degree/diploma in secretarial studies or any other business degree program for that matter [1].

Nevertheless, he has to brace up to proceed in his first lecture, but only to discover in subsequent classes the inevitability of business mathematics (or basic mathematics) in shorthand, typing, office practice, secretarial duties and in almost all his or her courses, in one way or the other, need application of basic mathematical knowledge. What does the prospective student do at this point in time? He relaxes, beats his chest and cries out that had he known, he

would have paid much (serious) attention to, and laid a firmer foundation, in mathematics at lower levels of his education since there is no short cut (easy way) to push aside the use of mathematical knowledge in his studies and or in all professions of the world be it in the arts or in the pure or social sciences theory and practice [2]. Secretarial administration is a course that is vital or rather indispensable in the management of any organization. As a medical doctor cannot practice effectively without a nurse or lab technician, so also an administrator or a business manager cannot function efficiently, without the services of a secretary. The secretary is the confidential and trustworthy assistant to her boss. He or she is not a “copy typist” who only knows nothing but the mechanical aspect of secretarial duties that is, typing or hitting (cutting) the alphabet on the typewriter. The secretary is a specialist (an all-rounder) in secretarial duties or office practice [5].

Various professions exist on an organization or a department, and for these professions to be adequately serviced by a

secretary, the secretarial courses on the syllabi must adequately equip the secretary with good knowledge of subjects that could put the professional secretary in good stead for any profession or administration the secretary happens to find himself or herself. For example, a secretary may find herself working under an accountant, or an architect or an engineer, without the knowledge of mathematics or statistics, the secretary would not be able to provide an effective secretarial service (duties) to these professionals [6].

Methodology

In this paper, we adopted both descriptive and exploratory analysis to discuss meaning, nature, features and implications of the importance of business mathematics to business studies programs in the context of higher education in Nigeria as it is applicable to secretarial studies profession, in particular. It employed fundamental analysis to explain the historical background and development of mathematics science history, showcasing its decline and rebirth in Europe, birth of mathematics. It further discussed developments in quantitative techniques applications to business as a branch of mathematics as it pertains to banking, manufacturing, planning political campaign strategies and designing oil tankers port facility. In particular, the paper used descriptive and exploratory analysis, to analyze application and use in business of basic mathematics, career opportunities that exist in secretarial studies as well as in the mathematics profession. All these discussions and analysis will lead us to establish some relevant findings and make informed recommendations for policy action.

Literature Review

Analysis of Issues Involved in Basic Mathematics Teaching and Learning. Most of the complex problems that arise in business tend to be solved either by using past experience as a guide against future, or by applying rules of the thumb that have grown up over the years. Whilst many of these rules work quite well in simple situations, they tend to break down as an organization gets larger or more complex. For example, transportation problems [7].

Hence, the council of UK Operation Research Society, defined operation research as: “The attack of modern science on complex problems arising in the direction and management of large systems of men, materials, machines and money in industry, business, government and defense”.

The council goes on to state that the distributive approach is to develop a scientific model of the system, measurement of factors such as chance and risk, in order to predict and compare the outcomes, alternative decisions, strategies and control. The purpose of this is to help management to determine its policy and actions significantly.

From the foregoing, it becomes obvious that the essence of BM study is concerned with acquisition of knowledge that

deals with the allocations and planning in complex situations involving scarce or limited human and material resources. This special knowledge and its acquisition have been lacking in our educational system, quite different from what is obtainable in western countries of Europe (UK, Italy, France, Germany, Greece, etc) and America (the USA) and Canada, and Eastern Asia and Latin American countries of Mexico, etc and others [8,9]. During the Summer School of 2012 in Arbadi Canazei, Italy, lectures with these two authorities: Prof. Stephen M. Schaefer of London Business School and Dr. Andrea Berardi of Università di Verona, experts in Credit Risk - Neutral Valuation, Structural Models I; Structural Models II - The distance - to - default and estimating default probabilities; Structural Model III - Modelling Early default; Structural Model IV -implantation and Empirical performance, and Single Name Credit Derivatives: Products and Valuation, etc. and An Introduction to Intensity - based Models by Andrea (2012), respectively, one of the present writers, Dr. S. O. Uremadu discovered that foreign scholars, virtually in all basic sciences, tended to be better grounded in basic mathematical sciences. They were taught in their mother tongue (language) been the reason why they beat black scholars in application of most fundamental theories in their area of specialization be it in social, pure and or applied sciences. For example, Dr. S.O. Uremadu in that Summer School discovered that other students in the economics and finance class some of whom were doctorate students of ages between 24 and 30 years, were better equipped mathematically than himself, their senior for that matter. It dawned on him and he had to bemoan his deficient background in basic mathematics. In sum, white scholars are better grounded in basic mathematics than the blacks hence they excelled in both application and modern inventions right from time in memorial [8,9]. When basic mathematical theories and concepts are explained to young minds in their mother language they stand a better chance to assimilate and apply those harder theories and concepts. There is indeed every reason for the Nigerian higher educational system to adopt and adapt to this approach if our long awaited functional education policy that would lead to industrialization of the national economy is to work. "A stitch in time saves nine", they would rightly say.

However, three main advantages are derivable from exposure to quantitative methods. First, the increase of confidence in decision - making orchestrated by the knowledge of vast and varied problems can be solved through the application of quantitative methods. Second, the creation of problems solving skills or device in the individual persons whenever they arise, and third, the drive towards the ability to cope with decisions as a professional secretary, and even in personal life. Accordingly, Lucey, documented that the essential ingredients of the approach include application of models based on scientific techniques to decision - making processes, the adoption of a systems approach to organization in the recognition of risk and uncertainty as well as the assistance to management in terms of decision and control of business activities [10,11]. Generally, these quantitative

methods can be broadly categorized as a field medley of business, economics, statistics, mathematics and other disciplines into a pragmatic effort to help managers and administrators alike in decision - making [12].

Therefore, applicably speaking, the professional secretary (as well as any other business graduate) requires a balanced training necessary for sound decision - making wherever he or she finds himself or herself. As such, the study of BM or QT, so to speak, will lead to serve as an added advantage training required of a secretary [13].

Development of mathematics science history

Mathematics Science History dates back to the first creation when man and woman were created on the 7th day, the creator having completed other things (living and non-living) at the 6th day. God made man out of necessity to man (i.e. rule) the whole earth (KJV). Man becomes the sole creature who coordinates and manages other things - this being an aspect of managerial mathematics [14,15]. Recall that God applied a simple calculation by calculating and fixing different time periods for adequate creation to be accomplished. For instance, 1st to 6th days, were used for the creation of all things but man, and the 7th day, for man's temple or the tablet of Ten Commandments that was handed over to Moses on Mt. Sinai (KJV, 1970). In the earlier days of man's development, he first learned how to count using his hands (fingers) and later diverted to use of sticks to count. Though mathematics has now developed more than this in the past years, and the world as a whole is more or less to be becoming mathematically inclined [1,2].

Scholars have also helped immensely to see that the study and spread of mathematics had been a success. An illustration will suffice. Mathematicians of the first century evolved certain mathematical skills of Egyptians and Mesopotamians to a high degree. It was improved on because the Egyptians and Mesopotamian mathematics lacked proofs and never attempted to generalize their postulates or specific problems. For these reasons, little assistance or credit was rendered to them for developing mathematics beyond computation which was a more mechanical aspect of the science of numbers.

However, Greek mathematics was later introduced. The Mathematics only lasted for the sixth century BC, the major advances established mathematics as the logic deductive science it is today. Deductive reasoning was recognized as the basis of proof and applies to geometry theorem (of Pythagoras) and mathematical truth when expressed in simple, generalized form [13].

Application and use in business

Secretarial administration entails studying courses such as accounting, data -processing, typing, office practice, shorthand, general studies and so on. For each of these and more, a knowledge of the business world is required. In this respect, the

supply of goods and services means that records are to be kept, financial transactions executed, calculated and subsequently recorded. Every employee whether clerk, manager, secretary, or book - keeper must have knowledge of addition, subtraction, multiplication or division of numbers; these are aspects of business mathematics, it should be rightly noted. It is here that the secretary comes to mention because she would be given lots of jobs to do, including calculations, by his or her boss. Now, without knowledge of mathematics science he or she becomes more or less a "copy typist" [1].

In speeding up the preparation of bills or invoices, one of the important procedures is through the use of a typewriter to prepare the bills quickly, clearly and uniformly too, and it is made easier by the secretary who is at home in typing operations (processes) and mathematics.

In addition, firms use electric calculator machines to speed up addition of bills, etc usually done by the clerk or rather by the secretary. The world is changing technologically and this compels the secretary to have knowledge of related subjects like business mathematics in order to catch up with the new trend. The secretary has to know these subjects so that he/she will not be a "copy typist", who only copies down exactly what is given to her by the boss.

A secretary might be given a complicated job to do which includes computerized issues or complex calculations. Besides in taking minutes, the boss could dictate calculative or cumulative figures to his secretary. Thus when the secretary has to "transcribe" the minutes, she would be faced with grave problems if she is not proficient in mathematics knowledge.

Furthermore, a secretary could be given a mathematical assignment by her boss and there could be mathematical errors in such jobs already made by her boss. If the secretary is not knowledgeable in calculations, she would, in turn, repeat the errors and send them back to her boss and when these are discovered, she has caused herself, her boss and her organization an embarrassment.

Whereas if she was well versed in mathematics, she could have detected the errors while going through the work and would have saved all of them from the avoidable embarrassment.

Having a knowledge of mathematics or computer science would also earn one an added advantage during job recruitment and or interviews [1].

Career opportunities

One notices the importance of recruiting specialized business mathematics teachers who read business studies proper to teach the course rather than employing the services of a general mathematician. The former could apply mathematical ideas in business analysis the latter cannot, since he does not understand the business implications of the raw numbers he has just calculated and churned out.

Members of one small group earn a living from mathematics but do not engage in research problem solving or teaching. There are mathematics editors, who, for the most part, work on science textbooks or magazines as well. Nearly all mathematics editors were teachers at one time or the other just as almost all "agboros" (i.e those who load passengers in motor parks) had been drivers at some time in the past. The education required of editors and the salaries they received are comparable to those of mathematics teachers.

As for the secretary, he/she has job opportunities in abundance in all professions and that is the more reason why the job market for secretaries can never be saturated. She is even more in demand than the accountant in every organization.

Summary of Findings, Recommendations and Conclusion

Summary of findings

From the foregoing analysis and discussions, the following discoveries were made as follows:

a. Mathematical knowledge cuts across all professions. Study therefore established that application of mathematical methods transcends virtually all endeavours of man and as such can hardly be avoided by a student in a particular field of study.

b. Study also discovered that mastering of mathematics will make one master his or her professions. Hence laying a firmer foundation in mathematical knowledge at lower levels of education (basic education) such as primary, secondary and college would, no doubt, foster an easy ride in one's chosen profession in later years in life.

c. The paper found that trained secretaries with good knowledge in business mathematics should be produced in greater numbers than "copy typists" in a bid to get the best out of them in the workplace leading to rise in productivity level of the personnel. Hence, having a good knowledge of basic mathematics is necessary for a trained secretarial duties or office practice. It may not be so for an ordinary "copy typist" [5].

d. Study also established that knowledge of business mathematics, operations research, computer sciences and the like lend credence to acquisition of knowledge which helps organizations deal with allocation and planning in complex situations involving limited human and material resources.

e. Findings equally established that mathematics science history dates back to the origin of man where man used managerial mathematics skill to man, co-ordinate and manage other creatures of God.

f. Finally, we discovered that trade among nations is only possible via application of mathematics in exchange dealings during international trade transactions.

Recommendation

Here, the study shall make the following recommendations based on the results and analysis arising from the findings of the paper thus below:

a. Since knowledge and application of basic or business mathematics science cuts across all professions, paper shall recommend that there is need for every student to have a good foundation of basic mathematics whether they belong to pure science or applied science.

b. From the results and analysis of the study, it was glaringly established that knowledge of basic mathematics is useful to all other professions other than secretarial studies program. This is because he or she needs mathematical science knowledge while carrying out his/her course work based on its contents as well as while conducting his/her research project work (report).

c. In carrying out research projects in most academic studies programs, stated hypotheses based on statement of the research problems and research questions and study objectives, statistical tools (techniques) and econometric modeling are used by both students of secretarial studies/programs and other academic programs in this regard. Knowledge of basic mathematics, statistics and econometrics helps in handling mathematical and statistical analysis and econometric modelling while conducting empirical studies to test hypotheses stated to guide results of their research project report. Therefore study recommends a good knowledge of basic mathematics to all students at basic educational levels. This is because a good knowledge of mathematics will enable him/her master econometrics and statistics, all of which he/she needs for his/her financial mind or econometric modelling while conducting and reporting findings of his research project report.

d. Knowledge of business mathematics equips the secretary to serve his/her boss well. Hence, having a good knowledge of basic mathematics is recommended to equip the secretary to serve his/her organization very well thereby assisting his/her boss to administer his company well.

e. Knowledge of topics in business mathematics such as ordinary least squares (OLS), statistics, forecasting, chance, risk and uncertainty, probability, simple percentages, compound interests, present values, time value of money, net present value (NPV), cash flows, etc, will enable business consultants to forecast the affairs or likely expectations of his business well ahead of time in an economic environment at both national and global market levels. Knowledge of business mathematics is therefore recommended as it is necessary to get a good grounding in one's chosen field of study.

f. Knowledge of operations research assists managers via use of systems and computer science to solve complex problems inherent in the management of large systems of men, materials, machines and money in industry, business government and

defense. Knowledge of basic mathematics will assist the student of secretarial studies programs and others to be versatile in the workplace. It is therefore so recommended.

g. The distributive approach help develop a scientific model of the system, measurement of factors like chance and risk, in order to predict and compare outcomes, alternative decision, strategies, and control that will aid management to determine its policy and actions significantly. Knowledge of basic mathematics science is recommended to aid the professional secretary in this perspective.

h. Knowledge or exposure to quantitative methods results in the increase of confidence in decision - making orchestrated by the knowledge of vast and varied problems that can be solved through the application of quantitative methods. Study therefore recommends proper acquisition of these quantitative methods computations to arm the professional secretary very well.

i. From the foregoing and review of past studies, we recall that findings of research established that mathematical or quantitative knowledge leads to the creation of problem solving skills or device in the individual person whenever problems arise. It equally leads to the drive towards the ability to cope with decision-making as a professional secretary, and even in the personal life of the worker and or his boss.

Conclusion

In conclusion, the study of basic mathematics introduced in the National Diploma Programs for Secretarial Administration studies in Nigeria is a most welcome innovation or idea in the country's higher educational policy. A secretary is not supposed to be just a "copy typist" but an all-rounder professional. This fact becomes necessary and glaring because he or she (the professional secretary is expected to be versatile). One who can conveniently act as clerk and even at times does the work of the boss. This becomes possible because he/she is the closest staff to the boss and can hold the office in his absence.

Therefore, the inclusion of business or basic mathematics in the secretarial administration degree program is very interesting and step in the right direction. It will afford the secretary an opportunity to know (master), and understand basic mathematics. And this will enhance her ability to cope with certain aspects of her job which will require computational or numerical skills [1].

The professional secretary will be in a better position to follow the operations of his/her accounts professionally especially in cases involving calculation of interest rates paid on savings account or deductions made on overdrafts.

Thus, a trainee secretary stands to gain immensely from the introduction of business (or management) mathematics (BM) in Secretarial Administration syllabus. It is hoped that the duration of the course may be extended to all levels: National

Diploma (ND) and High National Diploma (HND), to enable students have an in-depth knowledge of the subject as well as its mastery. A one semester study or knowledge of the subject (i.e. teaching and learning of basic or business mathematics) may not be enough to inculcate the requisite knowledge (skill) of this subject notwithstanding that new students into the management sciences degree program detest going to basic mathematics lectures. They have no option as grasp of the knowledge of the subject is inevitable and to learn it, they must whether they like it or not. "A stitch in time saves nine", says an English adage, best fits into our generalized beliefs and conclusions on the need to master the subject of basic mathematics at primary, secondary, diploma and undergraduate and even post graduate levels as this knowledge is necessarily needed throughout the life of his or her career. In the hope that all that has been recommended in this paper should be judiciously applied in the expected Nigerian functional educational policy so rightly desired in this 21st Century emerging market economies of today. The outcome will definitely raise productivity level of the Nigerian workforce.

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