Roles of Computer Applications And Tools In Transport Research Processes

[1]Adeniran, Adetayo O.; [2]Kanyio, Olufunto A.

[1,2]*Department of Transport Management Technology, Federal University of Technology Akure, Nigeria*

ORCID: https://orcid.org/0000-0002-6870-1212

Abstract

This study explored the roles of computer applications and tools in the transport research process. Information technology (IT) has become evident in the 21st century with the advent of the computer. IT is the encapsulation of computer and telecommunication applications that is used for storing, transmitting, and sending, retrieving, and processing data. IT is an essential part of transport research processes from the beginning stage to the completion stage. The transport research process has witnessed a swift turnaround in the 21st century with the advent of information and communication technology. The most promising tool in the transport research process is a computer. A computer is an indispensable tool in the research process, either for academic purposes or for commercial purposes. The usage of computers in the transport research process is massive such that it is complicated to achieve the successes of transport researches recorded in the present era without the usage of the computer. Several studies conducted today cannot be carried out with the devoid of computer especially those researches that involve highly complicated computations, modeling, and data analysis. Computers are applied in the transport research process from the conceptualization of the research idea to the publishing of the outcome such that the results emanated from such researches will be presented to the transport world.

Keywords — *roles; computer; application; transport research*

I. INTRODUCTION

The substantiation of information technology (IT) has become evidenced in the 21st century with the advent of the computer. According to Huber [1], IT is the encapsulation of computer and telecommunication applications that is used for storing, transmitting, and sending, retrieving, and processing data. IT is an essential part of transport research processes from the beginning stage to the completion stage. The existence of human being strongly relies on external supports such as a device that could be taken down on zeros and ones (0 and 1). For instance to broadcast events and messages or compute significant dates. This is the conduit journeyed by computer Isango antiquated bones across the IBM System which is a unit that is established by the complicated task of moving people safely to the Moon and returning them.

The computer has evolved all over the years concerning size, capacity, memory, computation, and others. The present-day computer is a multifaceted electronic device that can execute complex actions. It is a device that is interconnected with a composite or amalgamated subsystem which comprises of the enormous global network that is referred to as the Internet. There are several options such that interconnected computers are mostly boundless. Hence, it can be affirmed that the majority of human activities including the transport research process largely depend on a personal computer (PC).

The application of computers has huge significance in the level of the industrial revolution. According to Adeniran [2], the industrial revolution (IR) is a rapid change in the economy that is marked by the general introduction of power-driven machinery or by an important change in the prevailing types and methods of use of such machine. It is can also be seen as a sudden fundamental change in the industrial organization: the overthrow or renunciation of the first, second, and third industrial change substituted by the fourth industrial change of shift. Transport researches play crucial roles in the development of any nation, they are the key driver of development. The growth and development of any nation are highly embedded in innovation which is driven by transport researches that are aided by Information and Communication Technology (ICT). The rate of innovation in developed countries is very high that is why they contribute more to exports and transfer technology to developing countries.

The transport research process has witnessed a swift turnaround in the 21st century with the advent of information and communication technology. The most promising tool in the transport research process is the computer. A computer is an indispensable tool in the research process, either for academic purposes or for commercial purposes. In recent times, computers play a key role in virtually all fields of transport research process across all fields of study through a connection or network of globalized information system portal is World Wide Web (WWW). The World Wide Web enhances researchers to research on the colossal scale.

The computer is a system that has at all times been employed to get to the bottom of the challenges encountered by the human being since the moment of

invention, the size and dimension of the computer system have considerably reduced from that of a room built type to the one that can be positioned on the palm of human. The term "computer" is a machine for automatically computing or performing calculations. However, in recent times, the computer does not signify a calculator. It performs several tasks with incredible speed, effectiveness, and efficiency. According to Modh [3]; Rich [4], people make use of computers in almost every facet of life. This modern era is experienced with electronic computers that have now widely become a requisite part of every profession.

Computers have a very important role to play in all research activities. Different computer applications and programs have enhanced the smooth dynamics of the computing research process. In this paper, different software tools and applications are discussed as crucial to the transport research process and research activities such as literature search, conceptual design, data collection, model design, data analysis, and others. Computer application is connected to the advent of information technology.

II. LITERATURE REVIEW

A. Pertinence of Computer

The pertinence of computers in transport research is outstandingly high and the usage of computers can assist the transport research process enormously and is an almost priceless tool [5]. There are many reasons why computers are so pertinent in the transport research process and here are some of the key reasons which are speediness, precision, organization, and uniformity.

- Speediness

The computer can process information in a limited time. Therefore researchers can process and analyze data speedily. The speedy advantage enhances the researcher can conduct more researches and go through the rigors of the research process over and over again. The calculation that might require a person several hours to process will require the computer a few seconds.

- Precision

The computer is remarkably precise. Precision is highly pertinent in the transport research process. Wide of the mark calculation could lead to complete research or project that will be full of erroneous information.

- Organization

A billion pages of information are stored using simple folders, computer programs, and word processors. The computer is dynamic, safer, and more productive than using a paper system that can be easily misplaced.

- Uniformity

The computer cannot be tired or lose focus like a human being, hence it cannot commit an error. This characteristic makes it outstandingly pertinent in the transport research process.

Computers are more and more becoming pertinent, and intensifying all fields including transport research. There has been a daily improvement in the dynamics of doing things which have resulted to enhance better performance. Transport research is becoming the most turbulent and confusing area with transport research results conflicting and being published as a result of accessibility brought about by the advent of the computer.

More complicated transport processes, statistical analysis, and machine tools for complex computations, requiring the help of the computer. Transport research technology is gravely dependent on the computer; nevertheless, the area of transport research could not be unreal or unable to face the present dynamics without computers. In the global world, numerous satellites are already circulating for different purposes such as transport research. Transport researches carried out with the help of computers enhances the better innovation of the air transportation process, robotic journey to space and moon, discovery of transport solutions to cure the deadly virus diseases that are eating up human existence, and threatening sustainable development.

According to Branislav [6], the main feature in the computer dynamics is the use of transistor technology; it is significantly reducing the footprint, heating devices, as well as a significant reduction in price compared to the previous generation of computers. November 15. 1971, Intel's Electronic News, by an advertisement for its first integrated processor, which was labeled INTEL 4004 was the first CPU - Central Processing Unit, which gathered 2,300 transistors, wrapped in a piece of plastic no bigger than the nail. It was four-bits microprocessor, 16-pin, which worked on the mighty 740KHz, which allowed it to process 92 600 information in seconds. Microprocessor technology has set a new standard, and the only acceptable measures were integrated circuits [6].

Branislav [6] further stated that this generation of computers is characterized by the fact that the technology of microprocessor unit cost dramatically breaks, while the speed of operation, reliability, memory capacity significantly improved. Communication with the machine is built to a much higher level; there are machine languages, Cobol, Fortran, Basic, Pascal, and C Language. It begins to develop networking between computer systems! After the invention of integrated circuits, the next step was the designer's computer was the reduction of the size of the machine. Bulky drilling units and reading cards, packed in large metal boxes, are becoming redundant, the memory unit is also integrated - complete unit is easy to install on the work table [6].

Large scale integration / LSI / lets you store hundreds of components in a single chip. In the eighties of the last century, but is developing technology Very large scale integration / VLSI / several elements embedded in a small plastic chip is measured in hundreds of thousands of components. Developments in the field of electronics are extremely turbulent, and the next generation of chips can integrate millions of microelements - Ultra large scale integration / ULSI [6].

On August 12, 1981, at a press conference in the ballroom at the Waldorf Astoria in New York, Estridge (Don Estridge, Executive Director of the IBM labs) introduced the IBM Personal Computer, for $ 1.565. Two decades ago, IBM computer usually would cost over $ 9 million, and requested air-cooled, quarter morning room, and a team of 60 people to full information [6].

He noted that the computer that was based on the Intel 8088 microprocessor was the size of a portable typewriter, with 40 K of ROM /Read Only Memory/ and 16 K operating, working memory. Also, he had a built-in speaker system is OBD failures, Slaughter for upgrading, expansion memory, display, and printer. He was able to print 80 characters per second in 12 different styles of characters, has a color monitor, the memory can be expanded up to 256 K [6].

Public response to the presentation devices and propaganda that followed was beyond expectations. One vendor had twenty-two customers who have placed a deposit of $ 1,000 per trader although he could not guarantee even close to the delivery date. Daily New York Times, in late 1982, commented that the speed and scope of IBM success have surprised many, including people from IBM [6].

Dr. Dave Bradley developed a software for the first IBM PC, written in bios (Basic Input/ Output System) by three fingers help, command (Ctrl + Alt + Delete), the man wrote the interface with the new product and recalls that dozen people should work as a team and continues. He noted that "We met every morning to talk about what the machine should do and how, and in the afternoon we did realize the morning decision". It was revealed in his statement that regarding the prototype, they have started building at the end of that year, and they hired a then little known company referred to as Microsoft which is today referred to as the hull of the computer.

B. Information Technology

Information technology implies computers, ancillary equipment, software and hardware, procedures, services (including support services), and related resources. It also includes any equipment or interconnected system or subsystem of equipment, which is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information (Adeniran, 2016). IT is a set of technologies that creates, communicate, acquire, analyze, saves, and transmit information and data [7]. Information technology has become an essential part of any organization's success in today's globalized era. Zuboff [8] [9] stated that information technology is the computer-mediated work where a task is accomplished through the medium of the information system rather than through direct physical contact with the task.

Information technology is required for any organization's success in today's world to gain a competitive advantage [10]. There seems to be no aspect of human life that remains unaffected by information technology in recent times. Transport researches are carried out in a global academic environment mostly because of the singular factor of IT, and it may be difficult to serve present findings emanating from transport studies to the global academy without information technology.

Two basic opposing views exist about the impact of information technology on individuals. In the study of Zuboff [8], information technology (IT) are categorized based on the category of tools involved. There are two major categories, they are:

i. Automated and
ii. Informated.

An automated technology seems to deskill the processes that make up the work. This type of technology requires greater control and continuity over the work process, and it can be achieved by substituting technology for human labor with automated devices [9]. While information technology, on the other hand, is designed to upgrade or enrich the work processes. Information technology enhances the removal of most boring, repetitious, dangerous, and mindless tasks from the work. Therefore human labor is left to perform the creative, challenging, intellectual, and satisfying aspects of the task [9].

C. Computer Application in Transport Research Process

According to Modh [3], the transport research process consists of a series of steps that are indispensable to successfully carry out research and the required progression of these steps. The following bid concerning a variety of steps provides a useful routine parameter concerning the transport research process:

i. Provision of background to the study;
ii. Developing the hypothesis(e);
iii. Formulation of the research problem;
iv. Designing extensive literature (conceptual, theoretical and empirical) review;
v. Preparation of the research design;
vi. Determining sample design (sampling frame, sampling techniques, and sample size);
vii. Collection of the data (primary and secondary);
viii. Analysis of data and the test of hypothesis;

ix. Generalizations and interpretation of findings;
x. Preparation and presentation results; and
xi. Conclusion and execution of research.

According to Kothari [11]; there are five major stages of the transport research process. They are:

i. Conceptual stage;
ii. Design and planning stage;
iii. Data collection stage;
iv. Data Analysis stage; and
v. Research Publication stage

A. Position of computer in the conceptual stage

The conceptual stage comprises of formulation of the statement of research background, statement of the research problem, designing of an extensive literature which includes conceptual review, theoretical review conceptual framework, and empirical review, and formulation of hypothetical statements.

Regarding the usage of computers in the design of extensive literature review, computers enhance the swiftness of literature search and the storage of bibliographic references in the database of the World Wide Web. Thus, it can be employed for the storage of pertinent articles that are published to be retrieved as at when needed. This process is more advantageous than the search for works of literature in book form, editorials, and journals, and libraries which require substantial effort and time.

B. Position of computers in the design and planning stage

This stage comprises the preparation of transport research design and the determination of sample design. The design and planning stage also comprises of population, variable determinants, review of a sample plan, and pilot study. The position of computers for sample size determination is highly dependent on the available software for calculating the sample size required for transport research. The deviation of benchmarked data from the pilot study is needed for the determination of sample size. On every error term allowed, there must be justified.

C. Position of computers in the data collection stage

The data collection stage is empirical. It comprises of data collection and preparation of data for the analytical process. In transport research studies, the situation of data entering and preparation seems to be a time-consuming and effort demanding aspect of the transport research. Generally, the data must be collected and recorded through primary or secondary means for the suitability of acceptance by the computer. It is pertinent to note that whatever given as input to the computer will be processed with a definite output; however, the correctness of output is dependent on the capability of the researcher or computer handler. To carry out this operation, the researcher may need to collaborate with the programmer and statistician, so that the raw data will be converted and processed by Microsoft Excel (spreadsheet) or any statistical software package like SPSS, STRATA, E-VIEW.

Computers enhance data entry, data editing, data management, etc. It also enhances higher flexibility when recording data as well as superior ease during data analysis. Many of the researchers are anxious about viewing the data concerning how they are distributed, what they look like etc. Different dynamics and dimensions of variables are shown in charts with the use of statistical tools.

D. Position of computers in data analysis

This stage comprises of data analysis concerning the objectives set and the hypothetical statements which enhance interpretation and generalizations. The stage of data analysis consists of a statistical analysis of the data and results interpretation. Regarding data analysis, there are software that are readily available to carry out the mathematical aspect of the transport research process which involves the calculations using different dynamics of statistical techniques. The widely used software are SPSS and Microsoft spreadsheets. Having acquaintance with the statistical package is essential to carry out the most convoluted and intricate statistical analysis. Apart from statistical analysis, computers are very useful for monitoring the completeness and accuracy of the data as they are gathered [12].

The tools and applications involved in the transport research process are often statistical in nature. Among are SPSS, Spreadsheet, word processor packages. Statistical Package for Social Sciences (SPSS) is the commonest tool that statisticians adopt to carry out research analysis. Different versions are modified periodically [3]. The most recent versions of SPSS are IBM SPSS 20, 21, 22, 23, 24, and 25. The following indices are present in SPSS software tool:

a. Data view and variable view;
b. Measures of central tendency and dispersion;
c. Statistical inference;
d. Correlation analysis;
e. Regression analysis;
f. Analysis of variance;
g. Non-parametric test;
h. T-test;
i. Chi-square test;
j. Z-test;
k. Bipartite variable;
l. Multivariate data analysis;
m. Frequency distribution; etc.

Another tool of statistical analysis is a spreadsheet that simulates a worksheet. In the spreadsheet, there is a display of multiple cells that mutually make up a grid which consists of rows and columns. Each cell

consists of either numeric values or alphanumeric text. Microsoft Excel is dominated by spreadsheet software. Other packages of the spreadsheet are Lotus 1-2-3 Quattro Pro, Javeline Plus, Multiplan, VisiCalc, Supercalc, Plan Perfect, etc. Other statistical tools are SAS, S-Plus, LISREL, Eviews, etc.

E. Position of computers in the research publication process

This stage comprises of report preparation or results in presentation, hence, the conclusion writes up is accomplished. The transport research publication stage is virtually the end of the transport research process whereby the transport research findings are shown to the academic world through the World Wide Web. Online platforms are obtainable by converting word documents into other formats such as pdf, HTML, etc. They can be stored and edited on the internet for further accessing anytime there is a need for other researchers to fill the lacuna created.

For further researches, research publications and materials can be searched using Internet search engines among are:

Google Scholar: This provides a means to broadly search for transport works of literature in all disciplines;

ShodhGanga: This is an Indian theses repository all Indian theses can be stored and downloaded.

Microsoft Academic Search: This is a channel whereby information about academic papers, authors, conferences, journals, and organizations is found from different sources.

Mendeley: This is an exceptional platform that comprises of social networks, article visualization tools, and reference managers.

SSRN: This is a multi-disciplinary online repository of transport research and other related materials in social sciences.

Other well-known databases for transport research works of literature are:

i. AMS;
ii. Annual Reviews;
iii. ASME Digital Collection;
iv. Cambridge Core;
v. Chemical Abstracts Service (CAS);
vi. Cochrane Library;
vii. Discovery journals;
viii. eBook Academic collection;
ix. EBSCO Databases, Discovery Service, eBooks, Point of Care Products, DynaMed and Journal Collections;
x. EBSCO Information Services;
xi. Economic & Political Weekly;
xii. Elsevier;
xiii. Emerald eJournals;
xiv. Encyclopedia Britannica;
xv. IEEE Xplore;
xvi. Indian Citation Index.;
xvii. Indian Journals;
xviii. IOPscience;
xix. JSTOR;
xx. Portland Press;
xxi. Project Euclid;
xxii. Project MUSE;
xxiii. ProQuest databases;
xxiv. Royal Society of Chemistry Journals;
xxv. Royal Society of Chemistry Publications Online;
xxvi. Sage Online Journals;
xxvii. Science Mag;
xxviii. Scitation;
xxix. SIAM Journals Online;
xxx. Springer Link;
xxxi. Supreme Court Cases Online;
xxxii. Taylor & Francis Online;
xxxiii. Web of Knowledge;
xxxiv. Wiley Online Library

III. FINDINGS

Uses of Computers in Transport Research Process

There are varieties of computer applications adopted in the transport research process. Some of the most significant applications used in the transport research process are data compilation, data storage, data analysis, transport simulations, control of instruments, and knowledge sharing [4].

Concerning data storage, experimentation is the foundation of transport research processes. In natural and social sciences, most experiment produces several data that needed to be analyzed and stored to derive important and valid conclusions most especially from to validate or invalidate the stated hypotheses. Computers that are attached to experimental apparatuses record data as they are generated and the generated data are subjected to critical analysis through specially designed software. Data storage is doable in lotus spreadsheet, ASCII/DOS text files, SPSS data files, excel spreadsheets, etc.

Concerning data analysis, analyzing several statistical data is achievable using specially designed algorithms that are put into operation by computers. As a result of this, it enhances extremely time-consuming operations of data analysis to be achieved in a few minutes [13]. In transport management, computers have made the generating, recording, and analyzing of vehicle counts possible. It also takes into account the various types of vehicles which ply the particular road and time. Data obtained from different sources can be kept and accessed through the networks of the computer that is set up in transport research labs, which enhances collaboration and fragmentation simpler.

Concerning transport simulations, one of the primary uses of computers in transport management and transport/traffic engineering projects is the accumulation and running of traffic simulations.

Traffic simulation is the mathematical modeling of a traffic problem and a practical study of its probable solutions. Transport problems that are not easily subjected to transport experimentation could be studied through transport simulations that are carried out or established on computers.

Concerning instrumentation control, the majority of the advanced transport research instruments came with their computers which are programmed for executing various functions. For example, the traffic camcorder has its onboard computer system that is programmed to control the most significant traffic applications.

Lastly, concerning knowledge sharing through internet formation, computers have presented completely new dynamics to knowledge sharing. In recent times, anyone can have access to the current and new trends of researches that are freely accessible on websites. The Internet has enhanced knowledge sharing and collaboration; it has enhanced international cooperation on transport research projects. The different varieties of software programs for analytical operations have made computers contributed to transport research across all disciplines, particularly the transport-related, and discovering new and novel approaches.

IV. CONCLUSIONS

The existence of human being strongly relies on external supports such as a device that could be taken down on zeros and ones (0 and 1). For instance to broadcast events and messages or compute significant dates. This is the conduit journeyed by computer Isango antiquated bones across the IBM System which is a unit that is established by the complicated task of moving people safely to the Moon and returning them.

At first, the computer system is developed as a supporting device for carrying out complex and multi-figure computations. They are later used as a control device that should enhance the automation and mechanization of industrial machines. The computer has evolved all over the years concerning size, capacity, memory, computation, and others. The present-day computer is a multifaceted electronic device that can execute complex actions. It is a device that is interconnected with a composite or amalgamated subsystem which comprises of an enormous global network that is referred to as the Internet. There are several options such that interconnected computers are mostly boundless. Hence, it can be affirmed that the majority of human activities including the transport research process largely depend on a personal computer (PC).

It was concluded that the usage of computers in the transport research process is massive such that it is complicated to achieve the successes of transport researches recorded in the present era without the usage of a computer. Several studies conducted today cannot be carried out with the devoid of computer especially those researches that involve highly complicated computations, modeling, and data analysis. Computers are applied in the transport research process from the conceptualization of the research idea to the publishing of the outcome such that the results emanated from such researches will be presented to the transport world.

ACKNOWLEDGMENT

The Author appreciates BUTY GLOBAL research network (www.butyglobal.com) for taking the time to read through this article.

REFERENCES

[1] Huber, A. (2004). "*Mobile Payment-A comparison between Europe and the US: Semester Thesis*", University of Zurich, 2004.

[2] Adeniran, A. O. (2016). "*Impacts of the Fourth Industrial Revolution on Transportation in the Developing Nations*". *International Educational Scientific Research Journal*, 2(11), 56-60.

[3] Modh, J. C. (2014). "*Role of Computer Applications and Tools in the Research Process*". *International Journal of Research in Science and Technology*, 3(5), 33-40

[4] Rich, M. (2020). "*Research and Collaboration Tools for Students, Staff, and Faculty: Creating a Modern Memex*". Retrieved on 8th February 2020, from http://richmccue.com

[5] Omkar, P. (2020). "*Role of Computers in Research*". Retrieved on 8th February 2020, from http://www.buzzle.com/articles/roleof-computers-in-research.html

[6] Branislav, R. T. (2017). "*A Brief Overview of the Development of Computers*". *Research & Reviews: Journal of Engineering and Technology*, 6(2), 1-8.

[7] BreznIK, Li. (2012). "*Can information technology be a source of competitive advantage?" Economic and Business Review*, *14*(3), 251-269.

[8] Zuboff, S. (1985). "*Automate-Information: The new faces of intelligent technology*". *Organizational Dynamics*, 14, 5-18.

[9] Zuboff, S. (1988). *In the Age of the Smart Machine: The Future of Work and Power*. New York: Basic Books.

[10] Hemmatfar, M., Salehi, M., and Bayat, M. (2010). "*Competitive advantages and strategic information systems*". International Journal of Business and Management, 5(7), p158.

[11] Kothari, C. R. (2004). "*Research Methodology, Methods, and Techniques"*. New Age International Publishers, pp.10-19.

[12] Adeniran, A. O. (2018). "*Establishing Chi-Square as a Non-Parametric Test in Descriptive Statistics*". *Science and Technology*, *4*, 106-113.

[13] Adeniran, A. O., Adekunle, E. A., and Oyedele, O. J. (2017). "*Establishing the Concept of Research Hypothesis through the Relationship Between Demand in Nigeria*" International Air Passenger Traffic and Economic Variables. International Journal of Economic Behavior and Organization, *5*(5), 105-113.