

# SOCIO-ECONOMIC IMPACTS OF COMPUTER VIRUSES IN TANZANIA

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## ABSTRACT

**T**his paper reports on a research project conducted with an objective of identifying and assessing various approaches used by different computer users (Management, System Administrators and end users) in Tanzania to combat computer viruses (CVs), and to assess users' awareness level on CVs. Specifically, the study aimed at assessing the awareness level on CVs to the Tanzanian business community; analyze the socio – economic impact caused by CVs in Tanzania and; assess existing methods, capacity and limitations on controlling CVs in Tanzania.

Data was collected using both questionnaires and interview from financial institutions such as NBC and BOT, and telecommunications sector such as TTCL and VODACOM. Other institutions where data was collected included the higher learning institutions such as UDSM, DIT & IFM, Government institutions such as the Government Chemist, and COSTECH and Non- governmental institutions such as REPOA and ESRF.

After data analysis, it was found out that majority of the surveyed organisations were aware of CVs and about half of them employ client-server technique to successfully deal with the threat. These organisations spend between US\$ 12,000 to 40,000 per year to deal with CVs. This cost is mainly for paying licence fees for anti-viruses and for data back-ups. Some organisations rely on pirated anti-virus which are unreliable and in most cases lead to disasters and losses of data and production time.

It was concluded that CVs control should be given the highest priority to all ICT users. Also a policy on CVs should be well written and be instituted. Knowledge exchange on Anti-viruses' configuration should be enhanced among System Administrators within Tanzania. CVs control training should be done frequently to all workers. The use of an inert operating system such as Linux to control the spread of CVs should be promoted for use in workstations and for newly established organizations. Budget for CVs control should be considered at early stages.

**Key Words:** ICT, Computer viruses, Anti-viruses

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## INTRODUCTION

The use of Information and Communication Technology (ICT) in many Organizations and Institutions in Tanzania resulted into the spread of Computer Viruses (CVs).

Worldwide, spread of personal computers (PCs') resulted to a communication system, at that time (1980), known as computer bulletin boards. People started to communicate to each other through computer bulletin boards. Frequent uses of computer bulletin boards led to the precursor of the virus known as the Trojan horse. A Trojan horse is among the earliest strains of computer viruses. It is a computer program that when downloaded and tried to run can erase the memory disk. The earlier PCs had no hard disks, and their

programs were small in such a way that the operating systems including other programs were stored in floppy diskettes. So, one could turn on the machine and load the operating system including other programs such as games or word processor. While running it, a Trojan horse could wipe out the system.

Computer Viruses can be defined as computer program that makes copies of itself whether or not the computer is in operation and infects diskettes or files available in a hard-disk (University of Washington, 2004). Therefore, CVs can only infect files and corrupt data in a particular computer. Currently, viruses can even damage the hardware.

The word **VIRUS** is used as an acronym for "Vital Information Resources Under Siege"

(Kane, 1989). CVs are either self-distributed or sent by somebody through the e-mail system as an attachment file with extensions such as "pif", "vbs", "com", "bat", "exe", "scr", "lnk" or "js". Some actual Trojan filenames include: "dmsetup.exe", "movies.avi.pif", twice or more zipped files, and "LOVE-LETTER-FOR-YOU.TXT.vbs".

A worldwide survey done confirms areas which are highly affected with CVs to be financial services, government services, telecommunications and manufacturing processes (Townsend and Taphouse, 2002). The worldwide economic impacts caused by computer viruses reported on the website [www.cybersecure.ca/q2.htm](http://www.cybersecure.ca/q2.htm), are as shown in Table 1 (Beverly, 2001). This shows that serious negative economic impacts can be realized from CVs.

**Table1: Worldwide Economic Impact caused by CVs**

Year	Code Name	Worldwide Economic Impact (\$ U.S.)	Cyber attack Index
2001	Nimda	\$ 635 Million	0.73
2001	Code Red(s)	\$ 2.62 Billion	2.99
2001	SirCam	\$ 1.15 Billion	1.31
2000	Love Bug	\$ 8.75 Billion	10.00
1999	Melissa	\$ 1.10 Billion	1.26
1999	Explore	\$ 1.02 Billion	1.17

Source: (Beverly, 2001)

**STATEMENT OF THE PROBLEM**

As many institutions and various organizations in Tanzania are using ICT intensively in their daily activities, it is obvious that they are getting infected with various computer viruses. As a consequence some organizations experience some delays in production activities or do not achieve the set targets. CVs cause data losses and impose extra costs to replenish the defected parts as well as to pay experts. Also, the value of time lost while System

Administrators work hard to eliminate CVs from the systems is not well known. Globally, such information can be obtained based on reported incidences. So far, in Tanzania, there is no data/information available regarding this issue.

Tanzania online.org websites had registered about 105 different organizations, not including all ministries and government institutions which are using ICT intensively, despite the danger of losing their information when they get infected with CVs. It is not well known whether or not they are aware of the CVs and how they alert each other on the same. If they do so, the question that arises is, do they have any common means of defending themselves during CVs out-break? Therefore, there is a need to carry out research on some selected institutions/organizations so as to evaluate and study ways used by various System Administrators to overcome such situation and assess the socio-economic impacts.

**LITERATURE REVIEW**

A computer virus is a man-made computer program. A combination of three attributes to a certain program makes that program to be known as a virus. These attributes are replication, concealment and bomb (Brenton, 1999). In other words it is a section of a code of which, when executed, will attach itself to other programs in such a way that it will be executed when those programs are executed (Olivier, 1990).

Computer viruses are classified based on their targets and items they infect. That means, categorization is done based on their primary function and propagation method (Hameed, 2003).

**Categorization based on what they do**

This group comprises the Boot Virus, Program Virus, Multipartite Virus, Stealth Virus, Parasitic Virus, Polymorphic Virus, and Macro Virus. The Boot Virus infects the boot sector of hard-disk storage (for example, Form, Disk killer and Michelangelo). Infection is simply by accessing the disk. These viruses can "infect disks" by attaching themselves to special











