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The Economic Impact of Computer virus - A case of Ghana

¹ Henry Osborn Quarshie MBA (MIS) PG. CYBER LAW,

² Godfred Yaw Koi-Akrofi MBA (MIS), B.Sc, Electrical/Electronic Engineering

³ Alexander Martin- Odoom BSc, MSc (KNUST)

^{1,2} LECTURER REGENT UNIVERSITY COLLEGE OF SCIENCE & TECHNOLOGY, ACCRA, GHANA.

³ Lecturer School of Allied Health Sciences University of Ghana

¹ hquarshie@yahoo.com / sirhoq@gmail.com, ³ siel.miel@yahoo.com

ABSTRACT

In today's information technology world, Viruses are a huge problem for anyone who uses computers. Computer viruses and worms, a program that can spread across computers and networks has gone from being a nuisance to being the cause of the loss of millions of dollars worth of data, and loss of productivity. The writers of these programmes are becoming more adept at it day by day. Corporate viruses are a major problem which costs businesses billions of dollars every year.

The aim of this paper is to interrogate the economic impact of computer viruses and worms attack on institutions and industries, particularly in Ghana. In achieving this, the study examined the effects of the computer viruses and worms on the financial standing of organizations by assessing the cost in terms of lost productivity through the inability to use the infected computers, the restoring of adversely affected files and the re-installing of the networks involved.

The study confirmed the negative financial impact of such malicious programs on institutions. Cleaning up after a virus attack cost some Ghanaian firms \$122,280, over a period of twenty one productive days.

Keywords: *Computer virus, worms, Ghana, Economic Impact*

1. INTRODUCTION

According to a survey conducted by Consumer Reports in the U.S.A, in the third annual State of the Internet Survey in 2006, over the previous two years Americans have lost approximately US\$8 billion through computer viruses, spyware and phishing scams. Viruses alone cost consumers a total of US\$5.2 billion for replacing computers and hiring technical support people to repair their computers [4].

Frederick B. Cohen defined computer virus as a "program that can infect other programs by modifying them to include a possibly evolved copy of it" [3]. Computer virus spreads from one computer to another by copying itself to an existing executable code so that it is executed when the code it has attached is run. With the infection property, a virus can spread throughout a computer system or network using the authorizations of every user, thereby infecting the user's program. Every program that gets infected may also act as a virus and thus the infection spreads.

Computer worms have been defined as computations which live on one or more machines. The programs on individual computers are described as the segments of a worm; the worm's mechanism is used to gather and maintain the segments of the worm, whilst actual user programs are then built on top of this mechanism [3]. Basically a worm is a computer program or a piece of software that has the ability to replicate on its own. It arrives as an e-mail or newsgroup attachment and infects users who run the attachment. Worms can spread rapidly to other

machines on the network. If you work in a major corporation, this could be felt by hundreds of people and with a multiplication effect.

The writers who create these viruses have complete control over them. First, they decide what the virus will do. This consists of deciding how it will replicate and what type of damage the virus will do. Second, the writer has control over when the virus will perform the destruction. The writer can make it perform as soon as the program executes or they can delay it until a certain date or time.

Computer virus writers use many strategies to evade detection such as space filling, compressing and encryption in another hand; the antivirus software try to detect the viruses by using variant static and dynamic methods. However, all the existing methods are not adequate [2].

2. METHODS

The research covered five institutions in Ghana whose computers are networked and use a minimum of fifty computers. Their actual names were not used for security reasons. The names used only describe their activities.

The research looked at the following:

- The types of viruses and worms found on the computers.
- The costs associated with cleaning viruses from networks, servers and computers.
- The restoring of lost or damaged files.
- The lost of productivity caused by system-down time.

3. RESULTS AND DISCUSSION

Table 1: Shows the number of computers in the various institutions, the number of days the computers were infected with the viruses, the types of viruses, the number of days used to clean the viruses from the computers and the productivity days used in both infection and cleaning of the viruses.

INSTITUTIONS& INDUSTRY	NUMBER OF COMPUTERS	VIRUS INFECTION DAYS	TYPES OF VIRUSES	VIRUS CLEANING DAYS	INFECTION AND CLEANING DAYS
QUALITY CONTROL & INSPECTION	80	90	W32 SIRCAM, NIMDA, WXY, KLEZ.H STRAIN, OPASERV,M	21	111
OIL INDUSTRY	50	60	W32 SIRCAM LOVEGATE	7	67
BEVERAGE INDUSTRY	60	7	W32 SIRCAM LOVEGATE, BUGBEAR, NIMDA	14	21
LEGAL & REGULATORY AGENCY	55	30	ELKERN.A, BUGBEAR, STRAIN, REDOFF.	9	39
DATA BASE & REGISTRY AGENCY	33	21	WXY, KLEZ.H STRAIN, OPASERV,M	5	26

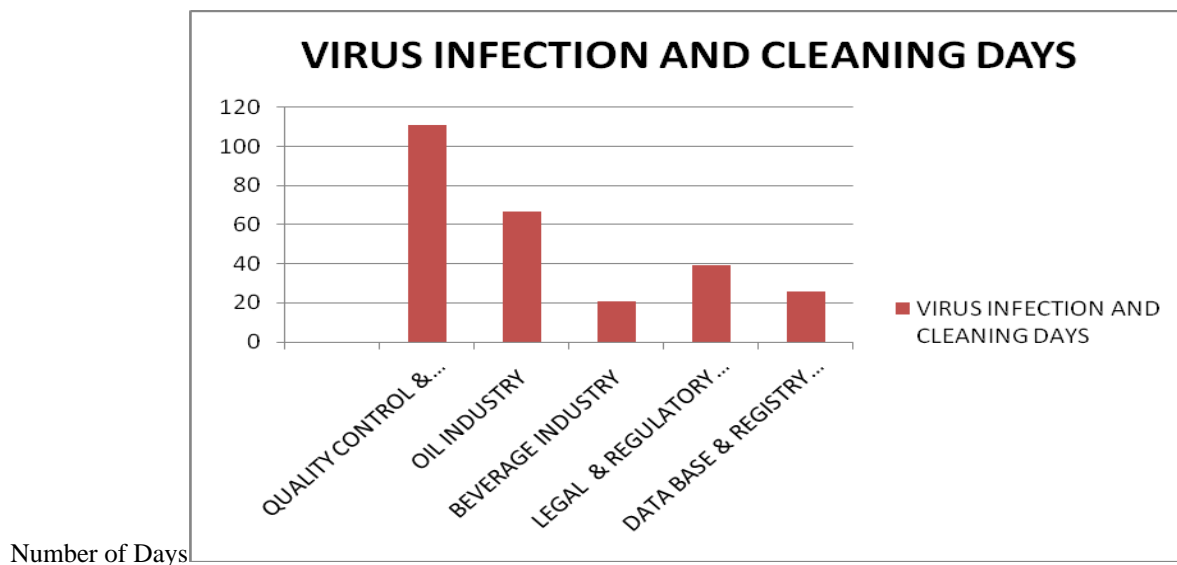


Fig 1

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To determine the number of productive days lost to the institutions, the research combined the number of days of infection and cleaning. All these days, work was slowed down. This is shown on figure 1. Quality control and inspection agency used 111 working days. Oil industry, 67 working days, Beverage Industry, 21 working days, Legal

and regulatory agency, 39 working days and Database and Registry agency 26 working days.

4. TOTAL COST ON STAFF

Table 2: In Ghana, the approved working hours is eight hours a day, and any additional hours is computed as overtime, which workers receive as additional income. The working schedule is a twenty-one days cycle in a month. Workers work from Monday to Friday, except organizations that provide essential services, such as police, military, fire and hospitals.

	Monthly (\$)	Daily (\$)	21DAYS	26DAYS	39DAYS	67DAYS	111DAYS
Senior Mgt. Level	7,000	323	\$3,392	\$4,199	\$6,299	\$10,821	\$17,927
	6,000	276	\$2,898	\$3,588	\$5,382	\$9,246	\$15,318
	5,000	230	\$2,415	\$2,990	\$4,485	\$7,705	\$12,765
Middle Mgt. Level	3,000	138	\$1,449	\$1,794	\$2,691	\$4,623	\$7,659
	2,000	92	\$966	\$1,196	\$1,794	\$3,082	\$5,106
	1,000	46	\$483	\$598	\$897	\$1,541	\$2,553
Other Staff	900	41	\$430	\$533	\$800	\$1,374	\$2,276
	700	32	\$336	\$416	\$624	\$1,072	\$1,776
	500	23	\$242	\$299	\$449	\$771	\$1,277

Table 2 indicates estimated salaries of staff at various management levels (senior, middle and others). The monthly salary for each person is based on the twenty-one days working denominator. Barring deliberate absenteeism,

workers salary are computed by this format. For each day when staff reports for work and due to the network being infected by computer viruses and worms, staff are paid for no work done; the longer the number of days, the higher the cost to the institution.

Table 3: Indicates the total productivity cost to the institutions. The Quality control and inspection agency which used 111 working days, lost \$122,280 . Legal and regulatory agency, 39 working days lost \$44,028 and Database and Registry agency 26 working days lost \$23,715. This is also shown on the graph on figure 4.

			50% EFFECTIVE WORK ON THESE DAYS		
	TOTAL NO. OF STAFF	TOTAL DAILY COST(\$)	21	39	111
EXECUTIVE DIRECTOR	1	276	2,898	5,382	15,318
DIRECTORS	2	230	4,830	8,970	25,530
MANAGERS	4	92	3,864	7,176	20,424

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INTERNAL AUDITOR	1	92	966	1,764	5,106
SECRETARY	3	23	726	1,347	3,831
SALES/MAKG STAFF	3	32	1,008	1,872	5,328
SUPERVISOR	1	46	483	897	2,553
PRODUCTION STAFF	30	23	7,260	13,470	38,310
ACCOUNTS STAFF	3	32	1,008	1,872	5,328
STORES STAFF	2	32	672	1,248	3,552
TOTAL COST PERTHE ORGANISATION			\$23,715	\$44,028	\$122,280

5. CONCLUSION AND RECOMMENDATION

A computer virus is similar to a medical virus in that it often occurs even when precautions were taken to prevent it. Malicious viruses steal information and data, which may be confidential. This may be customer or client information of a personal nature whether medical, financial or some other form. It may be company information specific to employees' records, user names and passwords or other functions of the business. Information may simultaneously be erased. It can pick up information from any other computer in the network. It can also locate other users and obtain their information.

The study confirmed the enormous cost to the institutions as a result of the activities of computer viruses and worms; on the average the cost was in excesses of thousands of US dollars within a one month period.

The recommendation focuses on prevention and detection. Prevention is always the least costly way to reduce the risk of virus and worm attacks. A virus, once it infects your computer, can easily corrupt or delete data from your computer.

To protect your computer from these threats it is vital that you have an anti virus program installed. Your antivirus program will do you little good if you do not keep your definitions up to date. New viruses are being identified all the time so it is vital to keep your antivirus program up to date on the latest threats. In addition to this measure, organizations could adopt the following:

Creating the awareness of the attacks of computer virus, sensitizing Staff on the need to avoid opening

suspicious websites, visiting cracked websites and downloading files only from trusted websites.

Organizations should also purchase licensed software because free software can be dangerous. Some come with all kinds of malicious programs which can be very harmful to servers, computers and can spread rapidly through networks.

Finally organizations should develop an effective information technology security policy to control the activities of staff. Some of the staff in organizations can be a source of worry since some of such staff when not controlled, would visit any website and download music, games and anything of interest without checking the source.

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