

*What managers need to be better acquainted with Information Technology?*

*What do Managers need to do to be better acquainted with Information Technology?*

*Challenges, Strategies and Perspectives*

*Abstract*

As businesses utilize information technology (IT) today, managers need to be aware of the past, present, and future challenges, strategies associated with IT and their perspectives in the workplace. A manager knowledgeable of IT can help a business gain a competitive edge, to be actively involved in decision-making, including IT selection, and benefit from the overall knowledge management. The question is: What do managers really need to know? Must managers be aware of programming, web design, operating systems, spreadsheets, data base, e-commerce, ethics, privacy and security issues surrounding the business they manage? This study explores what managers need to know about crucial topics in information technology. In addition the study investigates by use of a questionnaire what managers already know about information technology in four levels of skills ranging from basic to advanced knowledge. A conclusion has been drawn for managerial initiatives for continuous improvement of information technology knowledge and skills.

## ***Introduction***

Information technology (IT) provides a competitive advantage to managers by increasing productivity, performance, and obtaining cost leadership in business. Accessible, convenient, credible and friendly information technology can improve business processes to outperform competitors, both locally and globally. In addition, IT can help managers be more productive by increasing the number of employees who report to a manager. Managers are held responsible for compliance with continually changing laws and regulations, new IT issues and challenges. It is imperative for managers to stay abreast of changing technologies and the issues. Managers need to learn from past mistakes and vulnerabilities that IT presents with the increasing use of wireless technologies and mobile devices. A manager knowledgeable with IT is better prepared to prevent and mitigate risks to their business while leading it to success. Therefore the managers will be capable of assisting in development of strategic IT plan for the organization. Numerous innovative IT tools are available to assist management in obtaining pertinent information to aid in the growth of an organization. Managers should be proactive in embracing the use of networks, the web and e-commerce, in addition some knowledge of data base, spreadsheet and programming. Do managers possess a sufficient amount of IT knowledge to help their business succeed, secured and aligned with ethical values? This study examines what managers need to know about important topics in information technology. In addition, the study empirically assesses whether there is a need for further development of management's IT knowledge. Twenty managers with experience ranging from one year to more than 30 years in several fields were asked to complete a questionnaire to assess their amount of IT knowledge.

## ***Information Technology Challenges***

Information technology has gone through a series of challenges in the past such as abundance of programming as a result of integrated circuit (IC) invention, and Y2K, and continuing presence and growth of internet, web mobility and e-commerce which might lead to a chaos and discontinuity. Are managers prepared to take on additional challenges that information technology presents- a wake up call?

### ***Chaos: Programming, Y2K***

Information technology historically remembers two important events. While chaotic and costly at the time, they taught us a lesson to be carried on. Invention of large scale integrated circuit (IC) in the 1960's led to availability of memory and as a result it led to overzealous programming, creating programming chaos. This chaotic experience led to the invention of software engineering paradigm. In the year 2000, as a result of a need for the transition from 2-digit (99) to 4-digit (2000), and being a leap year, trillions of dollars was spent for compliance. Is management to be blamed for lack of vision?

### ***Software Attacks***

Information technology has become vulnerable to software attacks. Software attacks range from viruses, worms, phishing, pharming, and spamming. Viruses have and will destroy business information, resulting in much frustration, huge costs and loss to managers and users. Similarly, worms' destructive, and self-replicative behavior suffocates the network causing delays and failures. A threat to the organization's security and privacy may be caused by email phishing, collecting valuable information, and pharming of potential website visitors to another counterfeit website. Troublesome spam emails can solicit erroneous information, cause emotional stress and waste management's valuable time. More importantly, a large part or an entire portion of a business's information technology can be knocked out due to lack of security controls. Managers need to be aware of these potential software attacks and aim to mitigate risks by use of proper controls (Ebrahimi, 2005).

### ***Human Element Issues***

Information technology can be ambiguous, unfriendly to the manager and the user, therefore, prone to error. Erroneous and invalid information entered by managers and users can be undetected by information technology, creating undesirable consequences. Technology changes force people to adapt to change. Despite resistance to change, the new technology will require managers and users to learn and apply a new way of doing their jobs. Lack of communication between management and users in regard to implementation and use of information technology could cause confusion and unforeseen problems. To enable support for information technology change, both management and user involvement should be considered in the design of the systems. When designing the system, to ensure success, managers need to identify all of the necessary business processes and test the processes with the participation of the individuals who regularly perform the processes prior to the implementation of the new technology. Conducting this preventive measure will avoid disruption and ensure business continuity.

### ***Database and Knowledge Management Issues***

Information technology enables an organization to organize their indispensable data in a way to provide knowledge management. Data is often stored in multiple information systems that serve various operations of an organization. While information stored this way certainly serves some benefit, it is not the optimal solution to providing management with the information needed to assist and improve decision making. Information stored on different systems and in different databases may contain repeated data or inaccurate data. Information in one database may not be up-to-date and consistent with data stored in another database. Management should have an understanding of databases and the type of information stored in these databases. If managers are

familiar with database systems and their design, they can identify and resolve data base problems (Mayer, 2008). Most databases and database management systems (DBMS), which create databases, possess similar basic foundation and principles. It would be beneficial for managers to be acquainted with one DBMS, such as Microsoft Access, to aid in understanding others, such as Oracle, IBM DB2, and Sybase, which dominate the market share. The quality and efficiency of decision making across an organization will be improved with shared knowledge of individuals by storing, retrieving, and distributing the knowledge of the individuals in an organization. Larger organizations store information in data warehouses. Managers can gain important insights by the use of data mining, by exploring, aggregating, and analyzing data collected from the data warehouse, which in turn, use the information systems to collect, organize, integrate and store organizational-wide data. Managers can assess the organization's business processes, trends and other important information, thereby improving decision making capabilities.

### ***Management Support Systems***

Management strives to achieve the goals of an organization through the best use of the organization's resources, which are the people it employs, finances, energy, materials and other assets. Management's role of decision-maker will greatly affect how the organization's resources are utilized and should take advantage of the many available tools available today, such as decision support systems (DDS), executive information systems (EIS), group support systems (GSS), and expert systems (ES). Managers can use DDS and EIS to capture data from both inside and outside of the organization and combine current and historical facts, numerical data, and statistics to provide information to assist in decision making. Both DDS and EIS interpret the information and present it in a format to allow the manager to make an informed decision. The manager can benefit from a GSS to create a virtual group meeting to share information, enable collaboration and analysis leading to decision making to achieve a group's objectives. In situations where the decisions are very complex, an even higher level of support of an ES may be more appropriate. Managers should be familiar with ES as they are beneficial

to situations where consistency is desired and the decision maker wants to save time in making a decision while maximizing the quality of the decision. ES help with problem-solving, analyze patterns and trends, make inquiries, thereby providing valuable information to managers. ES mimic human expertise; for instance, in the event a company is downsizing, the expertise of retiring and terminated employees can be captured and retained by an expert system and distributed to employees or used to train new employees (Gelinas, 2007).

### ***Web, E-Commerce and Network***

Managers should be proactive by leading their organizations to embrace the use of networks, the web and e-commerce to avoid lagging behind their competitors in their industry (Weber, 2008). Websites are an important means of presentation and communication for organizations to market business products and services, replacing much of the traditional way of conducting business. An E-commerce website should incorporate qualities known as the 7 pairs of C's, which are (content, context), (correctness, credibility), (currency, continuity), (completeness, coverage), (consistency, conciseness), (community, customization), and (compelling, creativity) (Ebrahimi, et al, 2007). It is important that a web page is hosted in a reliable, secure and efficient web host, which can be easily accessed and run smoothly. An organization's network infrastructures, with its applications, takes the request from the client, validates the request, stores it in the server, and/or retrieve a response from the server back to the client. Management should know how to evaluate its organization's web page and have sufficient knowledge of the web hosting, minimal understanding of html tag commands.

### ***Ethics, Privacy and Security Issues***

Information is an indispensable key to business operations and IT facilitates the ability to use information to its advantage. However, laws and regulations prohibit use and disclosure of personal information for purposes of other than what it was provided for. Managers must ensure that information is safeguarded against misuse or theft. Ethics is considered as what is right and wrong according to an organization's code of ethics. It is

managers' responsibility to assure that their organization's principles and practices are ethical and that they are carried out as such throughout all levels of the organization. Company management should foster a culture that is information security aware and backed by strategies and processes that are continually tested, taught, measured and refined. Company policies concerning email, privacy and security of information should be enforced by management; and preventive measures should be implemented to avoid a breach of privacy and security of information. Encryption of data and/or digital certificates should be used when sending information over the internet (Lineberry, 2007). Managers should understand how simple encryption works and how to view and delete cookies, (which trace the user's internet footsteps) in internet options of the system. Access controls to systems, data and programs should be implemented so that information is not subject to unauthorized use, disclosure, modification, damage or loss; and that only authorized users can have access to information that is necessary (Mayer, 2008). Managers should be acquainted with principal of setting up secure passwords for the organization and understanding of how using a firewall to prevent hacker from getting easily to the network.

Managers should have a reliable disaster recovery plan in place in the event of disaster, such as an uninterrupted power supply for power failures or an off-premise data center which is a fully-configured replicate of the organization's programs and data.

Managers must be aware of the risks their networks and data may be exposed to when accessed by mobile devices through a wireless network. The use of laptops and hand-held devices poses a threat to privacy and security of information. Management needs to ensure that all personnel are properly trained and made aware of the privacy and security risks the company is exposed to through their mobile devices and that the proper policies and controls are put in place. The same principles applied to the safeguarding of the physical computer facilities should be applied to employees' laptops and other mobile devices. Again, the use of strong passwords or biometrics to gain access to the organization's network is recommended. Managers need to be aware that

the usual tools that may work on an organization's local area network may not be effective in a mobile environment (Weber, 2008).

### ***Developing a Strategic IT Plan***

With the expansion of globalization and the use of information technology in almost every organization, IT has more than ever come to be viewed as one of the most valuable resources to an organization's success (Carr, 2003). To ensure success, management should be involved in developing a strategic IT plan which aligns with the goals of the organization. Managers that have an understanding of their business processes and technology can help the organization to achieve their goals. According to McAfee, "once they decide what capabilities they need, managers will know what kind of IT to buy and the nature of the initiatives they must manage." Trust is an important element in developing a strategic plan. There must be open communication between management and IT personnel about new technology and its uses. (McAfee, 2006). Training staff and testing applications prior to going online can help ensure that there is continuity of the organization (Osterland, 2000). The creation of a secure, attractive, and easily navigated website for an organization can be a valuable tool in providing information to existing and potential business clients. This needs the joint effort of management and IT.

### ***Acquiring Software and Management Support Systems***

Management has several options to acquire software and management support systems or other application programs, such as an "off-the-shelf," leasing or developing software from scratch. Managers should know the advantages and disadvantages of each option. The "off-the-shelf" application program may prove to be fairly inexpensive, but it is usually developed for a wide audience and would not be tailored to meet the organization's specific needs. Leasing may be even less costly than purchasing a program, but it may not be the ideal solution. Internally developed software programs cost substantially more than those obtained from a

software vendor, but can be tailored to the needs of the organization. Therefore, acquiring new information technology should involve proper planning and assessment of the organization's needs to ensure that the benefits derived from the system exceed the costs of developing, installing and maintaining the system (Rainer, et al, 2009).

### ***Research and Development***

A considerable amount of money is spent on research and development (R&D), so it is important for managers to be aware of how funds are spent in this area. As Michael Wolff states in his article on R&D, "Companies succeed consistently by making good strategic choices, demonstrating operational excellence and making wise and balanced investments which include R&D, with innovation playing an important role (Wolff, 2007). In addition, R&D can make the innovation value chain adaptive, by anticipating and responding to changes such as competitive threats or new business opportunities (Radjou, 2006). Managers should ensure that their R&D aligns innovation with its strategic competitive goals, by identifying customer needs, so that they can achieve competitive advantage.

### ***Empirical Study of How Much Managers Know About IT Issues: Methodology and Analysis***

In order to explore the actual familiarity or knowledge of information technology that managers in various fields possess, this research investigates an empirical study. Twenty managers with experience ranging from one year to more than 30 years were asked to complete a questionnaire, as shown in Figure 1, to assess the levels of knowledge as it pertains to information technology. The managers questioned included four of which were employed in engineering, five in the aviation industry, five employed by a higher education institution, and six were in public accounting. The questionnaire assisted to determine the level of IT knowledge of each manager, by grouping the items into four levels. The Level I consists of the basic knowledge of email, internet, word processing and editing a document. Level II consists of additional knowledge of Microsoft Excel and

Microsoft Access or other similar programs. Level III knowledge consists of all of the former, with additional familiarity with website design, network applications, enterprise resource management and other management support systems. Level IV consists of an even more advanced knowledge of IT, including an understanding and knowledge of the privacy and security issues surrounding IT.

### Research of Management's Knowledge of Information Technology

Students enrolled in the Management Information System course at SUNY Old Westbury are conducting a survey of the knowledge of information technology of management level individuals. Our findings will be presented to a scholarly journal. We would appreciate it if you would take the time to indicate your knowledge of the following programs or activities, by writing to the left of the item - "V" if you are very familiar, "F" for fairly familiar, "S" if you have some, but little knowledge, and "N" if you have no knowledge. Please be honest with your answers and feel free to make comments next to any of the items. Thank you very much for helping out.

Job Title: \_\_\_\_\_ Years of management experience \_\_\_\_\_

- \_\_\_\_ Use of email
- \_\_\_\_ Internet use
- \_\_\_\_ Website design
- \_\_\_\_ Microsoft Word or similar word processing program
- \_\_\_\_ Microsoft Excel or similar spreadsheet program
- \_\_\_\_ Microsoft Access or other database program
- \_\_\_\_ Network applications
- \_\_\_\_ Enterprise Resource Management
- \_\_\_\_ Management Support Systems, such as Decision Support system
- \_\_\_\_ Expert system
- \_\_\_\_ Laws and regulations concerning privacy and security of data
- \_\_\_\_ Other (please indicate) \_\_\_\_\_

**Figure 1 – Sample Questionnaire provided to the Managers**

### ***Managers Study Analysis and Results***

After the questionnaire was distributed to the managers and data was collected, assessment of management's acquaintance or knowledge of information technology was determined based on the four levels of criteria. The result of the study indicates that all managers possess a basic Level I knowledge of email, internet, and knowledge of a word processing program. Fifteen percent of managers questioned have no more than the very basic Level I knowledge. The majority of managers, sixty percent of those questioned, possess a Level II knowledge of information technology, which includes those technologies included in Level I, with additional knowledge of database programs such as Microsoft Excel and Microsoft Access. Twenty percent of the managers have Level III knowledge of information technology; but those who did were exposed to it in their positions and had a real need for the knowledge. In regard to knowledge of laws and regulations concerning privacy and security of data (Level IV), only five percent of managers responded being very knowledgeable regarding these issues. It appears from our research that most managers do not go beyond Level II unless their positions warrant it. Our study findings indicate that there is a real need for managers to take the initiative to become self-educated regarding IT.

### ***Conclusion and Future Remarks***

With innovative technologies on the market today, it is important that managers stay abreast of these new technologies to ascertain that the organizations they manage remain competitive and successful. Whether the organization is small or large, the company's information systems should be designed to improve the effectiveness and efficiency of the organization. Managers knowledgeable of IT, including all of the benefits as well as risks, such as those associated with wireless technologies and mobile devices, are better prepared to prevent and mitigate potential risks. IT knowledge and the many tools available to managers to aid in decision making will help to ensure that the value derived from IT is maximized. Managers need to be proactive in

regards to obtaining the necessary IT knowledge and skills to ensure that the organizations they manage will identify and achieve its strategic goals. This study needs to be further explored.

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