CHAPTER 3:

ACCOUNTING INFORMATION SYSTEM

DEVELOPMENTS AND SECURITY

“Accounting is not static. It has changed in the past and will continue to adapt to changes in economic or social conditions in the future” {Accounting Standards Board Canada, March 2005}.

The researcher has divided this chapter into two sections: the first section is AIS developments and the recent directions; and the second section is AIS security and internal control. Every section highlights on the different Accounting Information System (AIS) issues.

The researcher’s goal of preparing this chapter is to highlight on the multidimensional of AIS, and to contribute in the high knowledge enrichment about AIS.

3.1. AIS DEVELOPMENTS AND THE RECENT DIRECTIONS:

The purpose of this section of this chapter is to present different models of accounting systems and their significant roles attributed to the entire AIS.

3.1.1. AIS Developments:

The history of accounting tradition shows that with the changing conditions and environmental adaptation, accounting methods and systems have changed a lot, from traditional to latest information technology planning and participation of systems play a very decisive role in the development.

The manual accounting system was the sole information system, which provided the users needs of the informative data, and with the development in the using of the
computer and quantitative analysis fashions to solve the problems, that management organization facing. The initial applications of information technology (IT) in accounting were based on transaction processing systems, which tended to mirror historically developed manual accounting processes. However, developments in the areas of accounting, IT and information systems over the last two decades proffer new ways of looking at the roles of AIS.

Accounting information can help businesses, to manage problems in a wide area; it also help business operation in a dynamic and competitive environment, unfortunately, accounting information systems (AIS) have traditionally been viewed as having a narrow scope and focusing on events within organizations, providing only financial-related information and having a historical orientation.

A modern accounting system needs to be sufficiently flexible to provide information, which is appropriate to both the organization and individuals’ needs. In order to achieve such individualization then critical issues which need to be addressed are the identification of the users of accounting systems as well as their individual and generic information requirements. With the invention of the ENIAC mainframe computer in 1946, a new technology became available for processing accounting data. Mainframe accounting systems proliferated throughout the 1960s, 1970s and 1980s. In 1975, the first microcomputer was developed and by 1980, the first "packaged" software (spreadsheet, word processing, and database) for these machines became available.\(^1\)

By the late 1980s, vendors started to offer fully integrated suites of applications that supported many, or most, of a company’s functions. During the 1990s, companies started to replace their homegrown legacy systems with ERP packages to thereby solve

\(^1\)Henry, Lauri, Op.Cit.
integration problems. Throughout the 1990s, the demand for these packages was driven by the high cost of maintaining legacy systems, the desire for new functionality, and the push of globalization and competition.²³

Today single vendor-based enterprise resource planning (ERP) software is the dominant strategic platform for supporting company-wide business processes. However, despite a strong and durable advocacy, several reservations have been expressed concerning the flexibility and ability to meet specific organization and industry requirements.⁴⁵ Also accounting information system developments do not occur for one time, it occurs repeatedly, and the developments in technical information fashions consider another motivates to change and improve.

Over the next few decades, advanced computer technologies should provide the opportunity for greatly enhanced accounting information systems⁶.

Study of accounting developmental is worth noticing. The researcher will discuss some developments that enhanced AIS.

3.1.1.1. Resource – Enterprise – Agents (REA)

Accounting is now being viewed in a much broader perspective to include non-financial, external, and future-oriented data, and with added emphasis on the economies of business operations and strategic management. Although AIS users can now generate and use accounting information in a more strategic way, the revolution in IT

and information systems have also raised several issues that need to be carefully addressed.

The important research initiatives was McCarthy’s Resource-Event-Agent (REA) model, which redefines relevant accounting data on economic events in such a way that data can be provided to service requirements for financial accounting information needs. The model (known as the REA model) consists of sets of economic resources, economic events, economic agents, and their interrelationships.\(^7\)

With the introduction of the REA model (McCarthy, 1982)\(^8\) which is able to eliminate several process-related artifacts associated with traditional value accounting, including the accounts receivable and accounts payable balances, and a chart of accounts. In a high-level data abstraction, balances for trade debtors and creditors can be derived from the imbalance between sales and cash inflows and purchases and cash outflows.

McCarthy has developed REA model; the REA is a framework describing the real world in terms of resources, events, agents and the relationships between them, and is able to fulfill all kinds of (financial) reporting functionalities\(^9\).

1. **The Components of the REA Model:**

   (McCarthy, 1982) described the REA model components as:

   1. Resources are defined as ‘objects that are scarce and have utility and are under the control of an enterprise’\(^10\).

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\(^7\) Omega, “Accountability lost: the rise and fall of double entry” British council journals database, August 2003 v31 i4 (8). p303.


2. Events are defined as ‘a class of phenomena which reflect changes in scarce means resulting from production, exchange, consumption and distribution’\(^{11}\).

3. Agents are defined as ‘persons and agencies who participate in the economic events of the enterprise’\(^{12}\). The figure No 3.1 expressed the flow relationship, defined between resources, events, and agents.

**Figure No 3.1 Illustrates the REA Relations (Resources, Events and Agents)**


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2. The REA Developments:

(Gal; McCarthy, 1986)\textsuperscript{13} developed a relational accounting information system that uses Query-by-Example (QBE) for generating database queries. A simplified version of the REA model has developed in (McCarthy, 1982) which used as a conceptual model of the database. Using simulated accounting data from a retail enterprise, financial reports were generated. Based on their development of the model, they noted that the QBE system could only manipulate whole relations and not individual items.

With the REA accounting model, in addition to revising the accounting process, McCarthy developed the concept of generalizations within the framework of events accounting systems. The concept of generalizations is used to develop the idea of super classes. These allow system designers to depict entities that have common attributes as a super-entity, in a higher-level data abstraction. This, in turn, provides a construct to comprehend and manipulate sub-entities as groups. As an example, McCarthy used the superclass 'inventory'; this superclass contains the common sub-entities 'finished goods', 'work in progress', and 'raw material'. Each of the sub-entities can be manipulated on its own, at one level of data abstraction, thus allowing specific entities to be modeled more precisely than the super class 'inventory' which is a higher level data abstraction. This approach allows manipulation of all 'inventory' types concurrently and provides the foundation for accountants and non-accountants alike to share in an integrated form of data, and its description. However, there are several limiting factors associated with the REA model\textsuperscript{14}:

\textsuperscript{14}Omega, Op.Cit.
1. The difficulties in representing the generalization relationship concisely and unambiguously.

2. The absence of explicitly separating and representing the semantic construct of generalization into its components of super classes and subclasses.

3. The absence of the explicit representation of composite category relationships (aggregation).

4. The lack of the representation of the temporal dimension of accounting information.

3.1.1.2. Decision Support System:

Decision Support System (DSS) is another design. The Dialog Generation Management Systems (DGMS), Database Management System (DBMS) and Model Base Management System (MBMS) are three components of DSS will be illustrated.

During the last several years, many early systems were improved by adding user-friendly features such as menu driven interaction systems.

There seems to be no question that these trends in decision support software will continue, since it is generally accepted that these systems can be useful to managers. While cost-benefit analyses are seldom carried out in detail, it seems that the demand for decision support software will continue to produce more and more sophisticated systems.

Decision support systems contain the data and information; in addition to that, it contains progresses and programs working to operate the data and information in making decision forms. For providing the information in a formula to enable the direct using of decision-making process, as models of Matrix, Linear Program and Critical
Lane. DSS are designed to support individuals, frequently managers, with little computing experience in a dynamic and decision-making environment\textsuperscript{15}.

In providing process independent support for the decision maker, a DSS must be able to adapt to changes in business strategies, data and the preferences of the user. A rapidly change decision-making environment prohibits a lengthy development process, as a system that takes too long to develop will be outdated before it is implemented.

DSS provide support for semi-structured and unstructured decisions and represent a multi-disciplinary field comprised of the researchers from Management Information Systems, Operations Research, Artificial Intelligence, Organizational Studies and others. Technological advancements and research advancements in other disciplines have been quickly adopted within the individual components or subsystems of DSS, namely, the Dialog Generation Management System (DGMS), the Database Management System (DBMS), and the Model Base Management System (MBMS). In the last decade, within the DGMS, interfaces have improved substantially in appearance and usability through the use of visual programming development environments. Similarly, the content of the DBMS component have been enhanced through Open Database Connectivity (ODBC), data warehousing, and web based data access. The combination of model management and artificial intelligence is essential in providing decision support and viewed as the cornerstone of more advanced DSS.

1. Computing Based Decision Support Systems

The concept of Artificial intelligence (AI), decision support systems (DSS), and expert systems (ES) are closely related, and it is not always clear where one leaves off

and another begins. Neither is there a generally accepted definition for each of these ideas. Nevertheless, most experts would agree that state-of-the-art decision support systems share four basic characteristics\textsuperscript{16}:

1. Computer: It is possible to implement a decision support system without a computer, but the ability of the computer to process vast amounts of data quickly and without error that makes most modern systems practical.

2. Interactive: Interactive may mean that the computer interrupts processing to request input from the user or the computer may provide intermediate results for the user to verify and respond to before further processing. In another form of interaction, the user interrupts the computer to request data and intermediate results or recommendations.

3. Data retrieval and manipulation: Decision support systems commonly support access to large databases in order to selectively retrieve, summarize, classify, or manipulate data. In some DSS applications data retrieval and manipulation are the main function of the system.

4. Decision model: Many DSS applications have as their main function the implementation of a decision model. A decision model combines data and decision rules to suggest a course of action.

\textbf{2. The Components of DSS:}

(Sprague; Carlson, 1982; Hess, 1999)\textsuperscript{17} Categorized the technical capabilities of a DSS into the three subsystems. These subsystems are the Dialog Generation and Management System (DGMS), the Database Management System (DBMS), and the

Model Base Management System (MBMS). The following subsystems discuss the general components:


   The DGMS subsystem provides the user interface and enables the user to interact with the DBMS and MBMS subsystems. Being the one component of the DSS which the user directly interacts, the user views the DGMS subsystem as the entire DSS. Usability issues with the DGMS can determine the overall success or failure of the DSS. (Sprague; Carlson, 1982) define the ability to provide dialog styles that reflect the preferences of the users as one of the four capabilities that the DGMS subsystem should support. This capability has proved difficult to successfully implement as most DSS do not take a proactive approach to ascertaining the user’s preferences. DSS that do provide this capability, frequently require the user to specify and store their dialog preferences.

2. The Database Management System Component.

   In the DBMS component of a DSS, the primary task is the capture and storage of internal and external data. Since the DBMS component within a DSS is often separate from transaction databases, the capture of internal data is a process that involves other applications within an organization and possibly remote sites within the organization. The capture of external data involves the extraction of data from either an internal collection source or directly from the external source. While the process of extraction should be automated so as to not disrupt the decision making process of the user, changing data needs, heterogeneous data sources, and distributed data sources often prevent this automation.

The primary function of the MBMS subsystem is the creation, storage, and update of models that enable the problem solving process within a DSS. The models utilize the data stored within the DBMS subsystem in creating alternate solutions for the user. The literature of the time suggests that, ultimately, a DSS should fit the style and modus operandi of each user, and that model should automatically be decided upon and invoked without burdening the decision-maker with the requirement of expertise in such matters. Two of the four functions of the MBMS identified by Sprague and Carlson deal with the way in which models are generated or restructured within a DSS. If the models used to propose alternatives are outdated or specified incorrectly, the usefulness of the DSS declines. The complexity and time consuming nature of specifying models, whether the models are stored as subroutines, statements or data, contributes to the ease with which models become outdated.

3.1.1.3. Case-Based Reasoning:

A case-based reasoning (CBR) system gets back past cases from its memory to solve a new problem. The basic viewpoint of CBR is that if a case has worked before, it should use to solve similar problems in future if a case has failed before occasion the same mistake should not be repeated. CBR has been applied to solve a wide variety of problems in different domains. The last few years have seen an increasing number of business applications of CBR, a business begins to mold with the idea of using CBR for their applications, as Artificial Intelligence (AI) methodologies, expert systems (ES) and Neural Network Systems (NNS), they have been in commercial use for a much
longer period of time. There are several advantages mentioned by (Morris, 2002) cites several advantages of CBR:

1. It solves problems quickly by retrieving similar cases, rather than generate solutions from scratch.
2. It can solve problems in domains that are not completely understood.
3. It can be used for evaluating solutions when no algorithmic method is available for evaluation.
4. It can be used to interpret open-ended and ill-defined concepts.
5. It can remember past mistakes and warn users not to repeat the mistakes.
6. It can use past cases to determine which parts of a problem to focus on.
7. It can create a justification for a proposed solution by comparing and contrasting the new situation with prior cases. The researcher will discuss Case-Based Reasoning (CBR) applications as the following:

1. **Artificial Intelligence:**

   Authors defined Artificial Intelligence (AI) in different ways. For example (Winston, 1984) has defined AI as “the study of ideas which enable computers to be intelligent.” (Kurzweil, 1990) defined AI as “the art of creating machines that perform functions that require intelligence when performed by people”.

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According to (Lugar; Stubblefield, 1993)\textsuperscript{22} AI is “the branch of computer science that is concerned with the automation of intelligent behavior”.

The artificial intelligence is one of the computer science fields relating to improve the intelligence of computerization to emulation the human intelligence, and the expert systems one branch of the artificial intelligence, these systems implement duties popular implement by the especial and expert human. In the past decades, there have been numerous articles about the application of AI as "expert systems”, which are called by some investigator "knowledge-based systems” also. The architecture of an expert system is presented in Figure No 3.2

Figure No 3.2 Illustrates the AI as Expert System, which Sometimes called knowledge-Based System

It shows that knowledge engineering is the first step in creating an expert system. The knowledge engineer usually acquires and places the knowledge into the expert system's knowledge base. In other words, the knowledge engineer is the interface between the human expert and the expert system. In an expert system, the knowledge base is kept separate from the control mechanism known as the inference engine, which directs or controls the system when it searches its knowledge base in a dynamic environment.
The expert system can be integrated with other programs and/or databases to solve specific problems.

AI, therefore, addresses such issues as computer vision, robotics, natural language understanding, knowledge representation, and reasoning. Of these issues, reasoning, and more specifically the development of expert systems, has generated the most interest among accounting researchers.

Artificial Intelligence methods can affect research in the design of accounting information systems in an additional area. Many of the data base design software systems (Reiner et al., 1985)\(^{23}\) incorporate various facilities to develop conceptual schemas and to ensure certain levels of consistency. Specifically, these design systems can handle enforcement of normalization and consistent use of terms in the database, but they are not able to assist in design problems that are specific to particular domains.

2. Expert Systems:

Another development to enhance the accounting information system developments, it is known as Expert Systems. Expert systems are useful and accomplish the decision made process.

Expert systems are different from existing decision support systems. Earlier decision support systems have generally made no attempt to emulate or copy an expert’s decision process. They have either used well accepted normative models to solve specific problems or provided data support for the human expert. Expert systems apply basic concepts of artificial intelligence (AI)\(^{24}\).

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(ES) is a system depending on the knowledge, using its knowledge in the applied field; it provides the advice and consults to the end user. So that it is similar to decision support system, in its content a basic of data and decision-making models, need to improve its basic knowledge and auto reasoning which enable the expert system to make decision.

The primary objective of accounting information systems is to provide useful information for decision-making.

Some authors 25 mentioned three alternatives for improving quality of the decision making process is to:
1. Provide different and better information.
2. Teach the use of better decision methods.
3. Automate the decision process.

Firstly; better information should lead to better decisions. One of the major difficulties in decision making is acquiring the proper or relevant information. The selection of this information becomes more difficult as the size and complexity of accounting databases increases. Expert systems hold great promise in identifying this information.

Secondly; training people to use better decision methods. Expert systems research holds promise for developing truly intelligent training devices that customize the training to fit the needs of the individual using the system. Indeed the capability provided in many expert systems for explaining the rationale underlying the systems’ recommendation suggests that expert systems themselves maybe useful training

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devices. In particularly, the expert system must be able to do more than merely replay the reasoning steps that followed; it must also be able to explain why those reasoning steps are valid. To do this requires meta-rules that represent the causal model of the task domain.

Accounting information systems researchers who are interested in developing intelligent tutors should be aware of criticisms of existing computer-based instruction.

Thirdly; alternative approach to improve decision making is to automate certain aspects of the decision process. One method for doing this involves the development and use of expert systems as decision support systems. They can be very effective in this regard for two reasons. Firstly, they bring an expert’s knowledge to bear in solving difficult problems. Secondly, they provide ability to interactive question and examine the line of reasoning being followed, thus causing them to be much more attractive than a system that simply produces a quantitative answer.

Expert systems have been used commercially in several fields. Numbers of expert systems have also been developed to perform accounting and auditing judgments. Auditor analyzes a client’s allowance for bad debts. Tax advisor does individual estate tax planning. Internal control analyzer evaluates the quality of internal controls in the revenue cycle. Audit planner makes planning-stage materiality judgments. Expert tax supports the corporate tax accrual process and provides tax planning advice to auditors concerning their clients’ tax planning
3. Neural Network:

A Neural Network System (NN) is finding more acceptances in the industry including different areas in business; a neural network learns from past data, there is no need to acquire knowledge from domain experts. Then network consists of neurons, which transform inputs to decision outputs through a series of weighting function and interconnections. The neurons are arranged in a number of layers, ranging from the input to the output layer. A neuron sums the input values in which receives and converts the sum to an output value through a transfer function. When the output value exceeds a threshold level, the neuron is activated and the output is transferred to the neurons in the next layer. A neural network is trained by providing it with examples or past cases.\textsuperscript{26}

\textsuperscript{26}For more details see: Morris, Op.Cit. 
www.accountingeducation.com/subsites/eca\textsuperscript{is}/2002/cbrstudyofthreesystems
3.1.2. The Recent Directions in Accounting Information Systems:

The perceived role of accounting information systems within business organizations has undergone a dramatic change in the last decades. The traditional orientation was more on the data processing capabilities of the system, with an emphasis on efficient methods to capture, record, and report accounting information. Organizations have evolved away from this data processing approach and more toward information systems approach. This orientation views information as an organizational resource and emphasizes its use in decision-making. As a result of this orientation, both the technological as well as conceptual characteristics of information systems have become increasingly complex. While these more complex systems can support a greater diversity of uses, they also pose a number of problems in their design and control.

In order to modernize organization’s information systems, many organizations have replaced their legacy information systems by implementing modern systems. In most cases, these investments were made to meet a number of objectives simultaneously. For example, within an organization, many different types of legacy information systems were in use that did not comply with millennium and Euro requirements. The focus of these old information systems was on offering basic transaction-based data with little attention paid to the need to provide decision-support information.

Sometimes, organizations went through a business process reengineering exercise resulting in organizational change, characterized by new information needs.

In a number of situations, existing legacy systems were poorly flexible to meet these new information needs. However, when most organizations had implemented their modern systems, a growing number of complaints were spoken. The ability new
systems ever to meet the new information needs as was their flexibility and future-proofing, supposedly sufficient to enable them to continue to be an organization’s central business information system for several years in dynamic circumstances of on-going change.

Nowadays because of globalization and continuous change, enterprises have responded by replacing legacy systems and investing heavily in information technology.

But the degree to which organizations can be successful in competition depends on the speed at which they can adapt to changed circumstances. This largely depends on the ability of their business information systems to support changing user information needs.

There is in addition to the systems that have been discussed, Enterprise Resource Planning (ERP) which are packages of computer applications that support many companies’ information needs. Significance and characteristics of Enterprise Resource Planning (ERP) will be discussed in the research.

3.1.2.1. Enterprise Resource Planning (ERP):

ERP systems are packages of computer applications that support many, even most aspects of a company’s information needs\(^\text{27}\).

Enterprise resource planning systems are commercial software packages designed to integrate an organization’s business information systems. Ideally, a flawless flow of information occurs from and to all parts of an organization, crossing geographic as well as functional and organizational boundaries. The enterprise system effectively overcomes time and space constraints through real-time access to a centralized

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database. The systems support multiple currencies and languages. Industry-specific versions of large ERP systems are available for many industries²⁸.

The ERP system integrates traditional accounting activities concerning transaction capture and processing with the other primary functions of the organization such as production, human resources management, and sales. Integrated processing supports and assimilates planning and control activities in addition to operations²⁹,³⁰.

Enterprise resource planning (ERP) systems are powerful software packages that enable business to integrate variety of disparate functions. ERP systems can provide the foundation for wide range of e-commerce – based processes, including web-based ordering and order tracing, inventory management, and built-to-order goods.

The diagram No 3.3 displays the most of the functional areas a financial information system could or should be capable to process. This kind of system can be considered as an enterprise resource planning system.

³⁰ Ibid.
Figure No 3.3 Illustrates the Functional Areas of Financial Information System as an Enterprise Resource Planning System

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1. Significance of Enterprise Resource Planning (ERP):

Many key business applications are now implemented using comprehensive and complex Enterprise Resource Planning (ERP) software. ERP software facilitates the flow of information among all the processes of an organization’s supply chain, from purchases to sales, including accounting and human resources. Process thinking is a key element in this business restructuring, differing from previous approaches with traditional application where departments within a company operated with poor interaction with other departments. ERP software eliminates the common problem of multiple incompatible software systems and databases in use in the departments or functional areas of many corporations. With one integrated comprehensive system (which could be distributed internationally) with one database, processes run more smoothly with up to date information available throughout the corporation.

Companies receive pressure to implement ERPs from professional service firms that provide ERP consulting services, including all of the major accounting firms.

The backbone of the system is a central database that stores, and makes readily available, data retrieved by the various application modules. Application modules include: financial functions; manufacturing/ service processes; quality and plant management; inventory and supply processes; human resources management; sales and delivery; customer service; and reporting capabilities\(^3\).

Other applications involve production planning, including sales and operations planning, materials requirements, and capacity requirements. Project tracking, budgeting, and even strategic management applications are available. The central database standardizes and streamlines the collection, analysis, and dissemination of data.

\(^3\) Dillard, Jesse F; Yuthas, Kristi. Op.Cit. pp.6-7
throughout the organization. The modules, or applications, carry out the activities associated with the function\textsuperscript{32}.

The acquisition of applications software and especially ERP software could have profound implications on a number of vital business issues. It can also tie up a large amount of company resources.

Every business area is affected; implementing ERP systems in a corporation is a complex undertaking and has been linked to the effort required in merging two companies together. ERP products are available from several vendors, including SAP AG, PeopleSoft, J.D. Edwards and Oracle. The ERP software market leader is SAP AG with the SAP R/3 System. There is great demand in industry for people that are knowledgeable about ERP and specifically about SAP R/3 system.\textsuperscript{33}

2. Characteristics of ERP Systems:

Enterprise Resource Planning (ERP) as mentioned above has become the domination in the market of business, because of ERP’s multi advantages and characteristics. The researcher will account some of those characteristics mentioned by different authors for example (Huuhtanen, 2004)\textsuperscript{34} who has mentioned 6 characteristics of ERP as follow:

1. ERP systems are packaged software designed for a client server environment, whether traditional or web-based.
2. ERP systems integrate the majority of a business’s processes.
3. ERP systems process a large majority of an organization’s transactions.


\textsuperscript{33}www.ryerson.ca/~ppille/sap/Resources/EnterpriseResourcePlanningSAP2.htm

4. ERP systems use an enterprise-wide database that typically stores each piece of data once.

5. ERP systems allow access to the data in real time.

6. In some cases, ERP allows an integration of transaction processing and planning activities (e.g. production planning).

   According to (O’Leary 2000)\(^{35}\) there are several ERP facilitates:

   1. ERP Integrates Firm Activities
   2. ERP employs use of "best practices"
   3. ERP enables organizational standardization
   4. ERP eliminates information asymmetries
   5. ERP provides on-line and real-time information
   6. ERP allows simultaneous access to the same data for planning and control
   7. ERP Facilitates intra-organization and inter-organization communication and collaboration.

3.1.2.2. Systems, Applications, and Product (SAP) Software:

   Systems, Applications, Product SAP software, and its functions are also significant in the proposed study, because it covers full range of processes used in every enterprise.

   Systems, Applications and Product (SAP), Oracle, PeopleSoft, J. D. Edwards, and BAAN represent the major ERP products. SAP, a German company, is the market leader, having gained around 30% to 40% of the international market and reported revenue growth from $500 million in 1997 to $7.3 billion in 2001.

(O’Leary, 2000) states that over 60% of multinational firms have implemented ERP systems to some degree, and the number of small and medium enterprises (SME) implementing these systems are increasing rapidly\textsuperscript{36,37}.

1. SAP R/3 Functionality

R/3 software allows the integration of a company’s business operations in an overall system for planning, controlling and monitoring. Over 1000 ready-made business processes are available, that include best business practices that reflect the experiences, suggestions and requirements of leading companies in a host of industries. When Microsoft implemented SAP’s financial modules, the company switched from a departmental organization, which was not supported, to a set of profit and cost centers\textsuperscript{38}.

SAP R/3 System provides an integrated suite of business applications that covers a full range of processes used in almost any business. The main application groupings are\textsuperscript{39}:

1. Logistics.
2. Financial/Management Accounting and Reporting.
3. Human Resources.

\textsuperscript{37}For more details see:
\textsuperscript{39}www.ryerson.ca/~ppille/sap/Resources/ EnterpriseResourcePlanningSAP2.htm
2. Future Enterprise Integration Trends and SAP Systems:

The need for enterprise integration tools is demonstrated by the current trend popularizing SAP R/3 software systems in US corporations. SAP provides a software system that accommodates enterprise resource planning.

In the early 1990s, System Produkte in der Datenverarbeitung (German for Systems, Applications, and Products in Data Processing) a.k.a. SAP AG Corporation, introduced their R/3 system to the U.S. market. SAP R/3 provides an extensive spectrum of integrated business applications on client/server distributed systems. The package runs on most versions of UNIX, Windows NT, IBM OS/2, Dec VMS, and Hewlett Packard MPE/IX, and supports a large variety of databases including Oracle, Informix, DB2, and Microsoft SQL Sever 6.

Many companies are justifiably reluctant to invest the capital required to install drastically new systems. Rather than adopting the R/3 package, many firms have installed SAP’s earlier R/2 system that runs mostly on IBM 370 mainframe computers. As of 1994, more than 2,300 customers used SAP’s R/2 system.

In addition to traditional business computing functions such as financial accounting and asset management, the SAP R/3 system integrates modules in production planning, materials management, sales and distribution, business workflow, human resources, and plant maintenance. SAP’s development agreement with Microsoft and Intel exemplifies the potential clout of this software system. Because of SAP’s adaptability to different types of industries, the software requires involved customization for each organization. Influential development of this client/server software can be expected in the future.  

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Traditional production companies such as Steel case and Cadbury are already using SAP R/3 for their enterprise resource planning. Consulting companies such as Price Waterhouse and Anderson Consulting are heavily involved in implementing SAP systems. Other companies currently implementing SAP include Proctor and Gamble, Apple Computers, General Motors, and Intel.

SAP and ERP software forces companies to reengineer or redesign their business processes. This means implementing the best business practices into the organizations business processes. The main idea behind the ready-made best business practices is the observation that large amounts of business processes in modern enterprises are alike.

3.1.2.3. Accountant Involvement in the Development of AIS:

Finally, accountant’s role in the developments of AIS will be discussed, because an accountant plays very professional role in accounting, his experience cannot be overlooked.

The development and implementation of AIS is complex because it involves human decision making in a situation where both social and technical considerations are critically important.

In order to effectively deal with the socio-technical aspects of developing an AIS, the accountant must acquire requisite knowledge of the latest AIS technology, must develop essential interpersonal skills, and must understand and engage the most efficacious involvement strategy during the AIS development process.

The purpose of accountants is to prepare, analyze, and verify financial reports and taxes. They also monitor information systems that furnish this information to managers; mathematical skills are required in accounting. Accountants not only need to
have the knowledge of arithmetic, algebra, geometry, calculus, and statistics, but they should also able to apply their knowledge in everyday situations. Accountants produce financial statements that need to be read by stockholders, managers, clients, supervisors, and banks. This information should be readable and understandable. Also, accountants should be able to explain and interpret the information on the financial statements to the people reading them. For example, if a figure relating to production is different from the figure on the last financial statement, managers want to know if that means that they are getting more efficient or if something needs to be changed so that they can meet their budget and other goals set for the company. Accountants should be able to interpret that information for them. Computer skills are a must when practicing as an accountant. The accountant should know how to use computers to send emails, write reports, input accounting information, use accounting programs, and assemble financial reports that accountants use to summarize the accounting information of the company or individual for whom they are working.

Many skills and much knowledge are needed to be a successful and effective accountant. The skills mentioned above are only a small sample of those required to do accounting work efficiently. Basically, if a person is well organized and self-motivated, accountants need to develop certain skills. These skills include interaction with computers, analyze information, and getting, processing and documenting information accountants also have to prioritize work, solve problems, interpret the meaning of information, communicate information to peers and supervisors and maintain interpersonal relationships.
Accountants are frequently asked to play a major role in the development of AIS. They bring their professional experience and judgment to bear in such decision situations. The accountant maybe a critical component of the development team as well as the receiver of the resulting AIS. As such, the accountant can be the AIS developer and/or the AIS user. The relationship we seek to address is when an accountant is asked to play a significant role in developing AIS for other AIS users. For example, an accountant working in management advisory services might be engaged to define and select new accounting software for a client, or a corporate controller may be asked to serve as a member of a development team responsible for integrating an electronic data interchange system into the existing AIS.\footnote{Hunton, James E; Price, Kenneth H. “A Framework for Investigating Involvement Strategies in Accounting Information Systems Development” Behavioral Research in Accounting Volume 6. Supplement 1994. p.129.}
3.2. AIS SECURITY AND INTERNAL CONTROL:

Security and Internal control are very important things to consider. In any organization, the steps must be taken to guard the entire system. Safe guarding tools will be studied in this part of the research, against security threats, so that organization will not suffer any loss, or be detrimental to such high technological crimes, that jeopardize the entire AIS.

How these increasing crimes can be averted, will also be taken into the study of the research. There will also be inclusion of the security threats to make users of the system to be aware of such crimes and threats. An exhaustive list of information technology threats will be made available to the users of computerized system of accounting in order to attain the information security, integrity, and decrease the possibilities of threats and risks.

There are steps suggested in the direction of controlling process. Controlling environmental process is another way to apply in organization. Internal control can be implemented; this will surely provide a reasonable assurance towards safeguarding organization assets…etc. Since internal control is deemed very important for any organization, this area of importance will be emphasized. Internal control objectives will be discussed too.

Further, the controlling techniques will be discussed, and training of human resource will be discussed, as it is very fundamental need for an organization to employ the proper persons to enhance the employment of efficient and honest personnel.
3.2.1. Security

Security is a continually process, not an event. Even when an enterprise implements the most advanced security solution, the pardon is only temporary because sooner or later attackers will find ways to get around the security solution.

Security must be an integral and significant part of Information Systems (IS) policies and original strategies. It maybe expensive to employ security consultants for reliable security equipment, but the return will be visible when the next hacker or virus strikes and your business continue to run.

Even if the companies have invested on reliable firewalls, invasion detection systems and anti-virus scanners to guard network perimeter, information systems (IS) policy has to be comprehensive enough to protect of a security incident happens, the business should be ready to deal with it quickly. In addition, employees must train to react and to minimize the damage.

Many companies have found out that, they have done too little in securing their systems and operations until a security incident happens. They would have to spend much more to repair the harm done to their systems and their name. Sometimes the damage is beyond repair when highly-valued competition data is stolen by a displeased employee or a cruel hacker. The companies have to keep a share of the business’s annual budget for Information Technology (IT). Absolutely, today’s complex computing environment, and the company’s security policies and infrastructure need to be reviewed regularly.
3.2.1.1. Information Security Concept:

The rapid developments in information technology conducted to interest in security and integrity of the information, and existence set of procedures and yardsticks that grant the information security and rightness in the organizations.

That procedures and yardsticks represent in security policies, personnel security, and physical security, controlling the entering to the system and analyses the risks to specify the information security requirements.

The information security means, existence a set of procedures and techniques which aim to attain the system protection of any future actions threaten the system may be conducted to loss the information or inaccuracy, the concept of information security and integrity including all the dimensions relating to attain maintenance and protect of confidentiality, integrity, availability, audibility, accountability, authenticity and reliability.

Many organizations and international authorities evaluate the extent adhering of the enterprises to apply the security procedures and controlling before granting the licenses to treatment with electronic commerce if the enterprise has an accredited certificate as WEB – TRUST CERTIFICATE, SYS TRUST CERTIFICATE.

These certificates validity for 3 years renewable again after revolution. From another dimension, Information Systems Audit and Control Foundation (ISACF) issued standard Control Objectives of Information Technology (COBIT). The main objective of the standard, the desire to issue international standards in techniques and good

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methods in control field on the information technology generally applicable and generally acceptable. The standard consists of 32 high – level control objectives.

3.2.1.2. Crimes:

Crimes mean direct or indirect using of information technology to performance illegal activities leads to harm the management, employees, and information users. The crimes committed by bodies’ insider or outsider of the organization have abilities to access the organization information system\(^\text{43}\).

Some of the crimes happened for example, in 2003, a survey conducted by the department of Trade and Industry in the United Kingdom revealed that 74 percent of all businesses and 97 percent of large companies had an IT security incident.

In 2004 at USA, in an alarming case of identity theft, accounts and passwords to a local bank’s internet banking portal were stolen using key loggers and money was illegally transferred.

In addition, in July 2005, data from thousands of credit cards were stolen from a server in the United States causing lots of trouble and embarrassment.\(^\text{44}\)

The access to organization information systems because of viruses harming the computer and programs, the viruses considered the most popular threat facing information security because multi kinds and born a new kinds everyday.

The viruses are programs operate and attach to the basic program system without knowledge of system users, which that programs auto work to harm the system. It is difficult to dispose of the viruses but shrink its negative effects.

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\(^{44}\)The STRAITS TIMES " Sun Microsystems" AUGUST 23, 2005.
3.2.1.3. Increasing Security Threats:

As the researcher mentioned previously because of, the fast change in information technology, the widespread of user–friendly systems and the great desire of organizations to acquire and implement up-to-date computerized systems and software have made computers much easier to be used and enabled accounting tasks to be accomplished much faster and accurate than previously. But this advanced technology has also created significant risks related to ensuing the security and integrity of CAIS.

The integrity and security of information system should able to retrieve any part lost of the system through using backups. The information security system should able to detect the weak points and continually correct that weak points, the system should be flexible, means when the failure of security procedures to protect the system of specific threat, the information system should redesign a new procedures to arrest threat.

It is necessary to say that, is difficult to design information system security arrest the risks, but it is possible to design system attains the information security and integrity means, decrease the possibilities of threats and risks to the minimized level by attaining the security of computer consists: hardware and different software.

The technology in many cases has been developed faster than the advancement in control practices and has not been combined with similar development of the employees’ knowledge, skills, awareness, and compliance. Everyday, reports can be found in accounting and financial publications about computer related data errors, incorrect financial information, violation of internal controls, thefts, burglaries, fires, and sabotage. Organizations should be aware of the potential security threats that might challenge their CAIS and implement the relevant security controls to prevent, detect,
and correct such security breaches. Although the considerable efforts have been made by practicing accounts to reduce the vulnerability of CAIS to such events, it is argued that an increased effort is still required (Abu – Musa, 2001; Abu-Musa, 2003).45–46.

In 1996, a survey of specialists in computerized accounting information systems noted increased use of networked personal computers with shared data, networks, and stand-alone computers with modem connections to external users, and mainframe access to and from remote locations. These individuals rated the risk of security problems as moderate with stand-alone personal computers (49.7 percent), moderate with internal networks (63.8 percent), moderate with mainframes (71.1 percent) but high with any computer with external communications connections (71.4 percent).47

This unlimited access from anywhere and by anyone to electronically recorded data requires a change in the focus of controls and security methods that are often not fully understood or appreciated by the business owner.

Statistics suggest the loss of accounting information with the new technology can be caused by a variety of exposures: software may malfunction or be in error (14 percent), hardware may malfunction or be stolen (44 percent), destructive natural forces may occur (3 percent), human error (32 percent), and man-made disasters such as computer viruses (7 percent). A few simple security methods may be employed to limit the possibility or outcome of such occurrences.48

48Ibid.
(Loch et al., 1992)\(^{49}\) developed a list of twelve security threats, but (Abu-Musa, 2001)\(^{50}\) developed the following list of nineteen security threats to be used in investigating the perceived security threats of CAIS in the EBI (Egyptian banking industry):

1. Accidental entry of bad data by employees.
2. Intentional entry of bad data by employees.
3. Accidental destruction of data by employees.
4. Intentional destruction of data by employees.
5. Un-authorized access to the data and/or system by employees.
6. Un-authorized access to the data and/or system by outsiders.
7. Employees sharing pass words.
8. Natural disaster such as fire, flooding, loss of power.
9. Human-made disasters such as fire, loss of power.
10. Introduction (entry) of computer viruses to the system.
11. Suppression or destruction of output.
13. Theft of data/information.
15. Un-authorized document visibility by displaying on monitors or printed on paper.
17. Printing and distributed information are directed to people who are not entitled to receive it.


\(^{50}\)Abu – Musa, Ahemd A. Op.Cit.
18. Sensitive documents are handled to non–security cleared personnel for shredding.

19. Interception of data transmission from remote locations.

(Abu-Musa, 2004)\textsuperscript{51}, also conducted an investigate study in Saudi Organizations about the significant perceived security threats of computer accounting information system, through their frequency of occurrence.

The conclusion of the investigation has shown that there are no significant differences between different organizations’ types regarding the frequency of occurrence of the computerized accounting information system security threats in the Saudi Organizations.

3.2.1.4. The Information System Protection:

Research into the area of secure computing systems is extensively addressed in the Computerized Information System (CIS) literature.

Both the Institute of Electrical and Electronics Engineers (IEEE) and the International Federation for Information Processing (IFIP) have organized technical committees on computer security and privacy, and hold annual symposiums on the issues of computer security.

IFIP also publishes a quarterly journal, Computers & Security, “devoted to the study of technical and financial aspects of computer security.” Articles addressing security related issues also appear in many other CIS journals as well. Security oriented conferences are occurred with increasing frequency, sponsored by different computing related organizations.

In 1984, for example, the First National Computer Security Conference was sponsored by the National Computing Center and Elsevier International Bulletins


In addition to the researches, conferences and numerous of interesting organizations which have mentioned above about information system protection, the researcher will elaborate some of the security tools and methods.

Physical security of assets is an element of any accounting system, computers and information they contain or process are valuable assets to any business. Locking buildings and rooms containing these assets are the most basic methods of deterring loss.

Alarms, video cameras and motion detectors may be included as part of the security system. As computers become more and more portable, however, it becomes necessary to secure them to tables and desks with cables and plate locks. Computer media such as disks and tapes should not be neglected in this process; lock these items in a secure storage area. Some form of fire protection and detection is extremely important to safeguard both data and equipment, as is an uninterrupted power supply to maintain processing and data integrity.\(^5\)

Limiting logical access to data and programs through the computer and communications devices is the next level of security and has become increasingly important with the ease of remote access to computer via modem.

\(^{52}\)Amer, Tarek. et al Op.Cit. pp.15-16

An outgrowth of limiting logical access, is limiting changes to programs or the development of new programs. All systems changes should be authorized by upper management and should be duly documented.

Physical and logical access, controls and safeguards over information are required to protect information against acts of nature and intentional malicious acts such as unauthorized creation, modification, or destruction, as well as inadvertent errors that could compromise its integrity.

Another aspect of security involves protecting the confidentiality of information; that is, protecting it against unauthorized viewing or dissemination. While confidentiality is an important aspect of security, it is conceptually different from representational faithfulness. And, although some security controls serve to simultaneously protect information against threats to representational faithfulness and confidentiality.\(^{54}\)

Passwords have been in use for 30 years to identify users in the computer environment and are still a very useful tool. Employees should be made aware of the importance of keeping their password secret and logging off the system when they are not using it. Passwords should be changed regularly, and after a certain number of attempts at entering a password, the system should no longer allow access.

Another valuable security method utilizes the capability of security software by providing a user access control matrix. This program determines who may have access to data and programs and what the nature of that access may be (able to read data, able to change data, able to delete data). This is particularly important with the increasing use of databases and electronic data interchange.

Security software can also record all user activity and the terminal that was used to access data or programs. This activity log must be carefully monitored, however, to provide the security desired\(^{55}\).

Biometric identification is devices identify unique physical characteristics such as finger prints, voice patterns, retina prints, facial patterns and features, body odor, signature dynamics, and keyboarding patterns, when a person desires access to the system, his or her biometric identifications are matched against those stored in the computer\(^{56}\).

The firewall acts as the primary barrier to intrusion and corruption of internal company systems. The effectiveness of the firewall is proportional to the degree of separation that can be maintained between the web site and internal data\(^{57}\).

Encryption, the coding of text into an unreadable string of characters based on math algorithms, is an effective method of preventing browsing of confidential data.

A decoding key is needed to be able to read the original message. This method can be employed when storing sensitive data or programs and when transmitting or receiving data from external sources. Two types of encryption systems are available: the secret key system requires both parties to have the decoding key, and the public key system where the message is encrypted with a public key and the receiver decodes the message with a private key.\(^{58}\)

Computer viruses are lines of code that reproduce and attach themselves to other programs. In some cases they simply fill memory and slow system processing, while in

\(^{57}\)Huuhtanen,Juha.Op.Cit .p.18
other cases they are designed to destroy or change data and programs. Viruses may be introduced through external communications systems or by using floppy disks or CD-ROMS that are infected with the virus. They are particularly problematic with networked computers.

Virus protection/detection software is usually included in newer computer operating systems, and is readily available from reputable vendors for older systems. This software should be updated on a regular basis to take advantage of its detection of newer viruses. Such software should be set to automatically scan computer files when the system is first turned on. Employees should be trained to scan any external media they introduce to the system during their daily activities also.59.

3.2.1.5. Disaster Recovery Planning (DRP):

A disaster is generally defined as any interruption in a company’s operations that will significantly affect employees and / or customers. A DRP is the method which a company identifies critical resources, determines how these resources are negatively impacted by a disaster and develops a plan to minimize and recover from the negative impact of a disaster. A proper DRP satisfies the following objectives60:

1. Protection of assets and records
2. Resumption of normal operations
3. Protection of personnel
4. Continuity of management
5. Minimizing the losses and recovery time.

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60 Carlson, Steven J.; Parker, D J. "Disaster recovery planning and accounting information systems" Review of Business, Winter 1998 v19 n2 p10 (6).
It is very necessary that companies should have disaster recovery plans, because the availability of such information can affect their success.

The accounting information system component of a DRP focuses on the organization accounting related data requirements for making decisions. Disruption in the continuity of a business for an extended period of time seriously affects the overall viability of a company and may eventually lead to bankruptcy.
3.2.2. The Internal Control Systems:

In this sub-section the researcher will focus several issues relating to internal control in general as internal control definitions, significant and objectives ……etc.

3.2.2.1. Internal Control Concepts:

The concept of internal control or security is as old as accounting itself. The purpose of accounting was to report accurate financial information on business ventures to interested parties and to provide information on stewardship of assets. The very development of double entry accounting was specifically aimed at controlling errors.

The first formal definition of internal control or security by the accounting profession was in 1949 and a Statement of Auditing Standards on such controls was issued in 1958. However, United States businesses were under no legal obligation to institute such a system of internal controls until the passage of the Foreign Corrupt Practices Act of 1977. Since that time, the concept and methods of internal control in accounting information systems have evolved and changed as new technological innovations have been incorporated by the accounting profession\(^61\).

Nevertheless, the Committee of Sponsoring Organizations (COSO) defined Internal Control and has given Key Concepts. The Committee of Sponsoring Organizations (COSO) is a private sector group. In 1992, COSO issued the results of a study to develop a definition of internal controls as the process implemented by the board of directors, management, and those under their direction to provide reasonable assurance that control objectives are achieved. This mean\(^62\):

1. Internal control is a process. It is a mean to an end, not an end in itself.


2. Internal control is affected by people. It is not merely policy manuals and forms, but people at every level of an organization.

3. Internal control can be expected to provide only reasonable assurance, not absolute assurance, to an entity's management and board.

4. Internal control is geared to the achievement of objectives in one or more separate but overlapping categories.

   The need for sound internal accounting control in Office Information Systems (OIS). While advanced OIS technology offers the potential for enhanced worker productivity, consideration must be given to satisfactory accountability and control structures, which protect corporate assets from theft, misuse, and fraud.

   (Wysong, 1983) argues for increased internal auditor involvement in the design and development of a given firm’s information system, noting that high system development and modification costs dictate the inclusion of controls into the design of systems rather than adding them later. Internal auditor involvement should be advisory in nature, as they must maintain their independence and objective viewpoint in all associations with systems design personnel.

   (Hindmarch, 1997) has defined control, the activity of checking what actually happens with what was planned and feeding back information to the decision maker, so that he can take whatever action seems necessary.

   In addition, it is a process measure or comparison the planning with the actual results to diagnose the variants, and treatment of those variants.

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64 Hindmarch , arther; et al. Op.Cit. p 221.
There is another definition from Indian author (Kulkarni, 2002)\textsuperscript{65} who says that the control is the checking up part of the job of managers, managers measure, check, comparing the performances, with the standard ones. Management begins with planning activity and controlling helps the management for timely accomplishment of the properly executed tasks.

We can say from all definitions mentioned above, the internal control is a set of the systems putting to control the enterprise, equally to control the financial aspects or no financial aspects, that putting to rightness the work movement in the enterprise of all its aspects.

One of the most important functions of management is internal control of the undertaking. This comprises all arrangement intended to control the raising of the firms funds, safeguard its assets, ensure that both are raised or applied only for properly authorized purposes, and maintain accurate and reliable records of all matters concerning the firm.

An important aspect of internal control is internal check, the arrangement of the book-keeping and other records to ensure as far as practicable that every entry is checked, in the ordinary course of duty, by at least one person other than the one who made it, and that every original entry is properly supported by a document made out or checked by some other person.

Internal check like internal control in general, thus goes well outside formal bookkeeping. Internal check, whether or not supplemented by internal audit, is most valuable as a mechanism for bringing clerical errors to light quickly, before they run

right through the accounting system and as a moral determent to employees of weak
carer who might otherwise be tempted to defraud the firm\textsuperscript{66}.

3.2.2.2. The Internal Control Components:

Internal control’s definition was stabled from 1949 till now, the organized planning
of the organization including the internal control, and all the consistence and
measurement tools, that organization perform to protect its assets, secure the accuracy,
verification of accounting data, developing the operating efficiency and encouragement
all the employees in the organization to follow and adhering the putting managerial
policies. Components of internal control system illustrate in the figure No 3.4.

\textsuperscript{66}Molly Millars Lane; et al. “Modern financial Accounting” 3 rd edition, Van Nostrand Reinhold (UK)
Figure No 3.4 Illustrates the Internal Control System Components

Basic components

Managerial components
- Existence the rightness organized plan.
- Existence the rightness plan to select and train the employees and check their performance.
- Rightness the performance standards.
- Separation of duties.
- Organize the Internal sections.
- Organize the employee’s vacations.
- Frequency changes of the employees duties.

Accounting components
- Full group of records and vouchers.
- Adherence of the accounts index.
- A clear vouchering cycle.
- Utilization of the auto-techniques.
- The continually comparisons.
- The actual verification of the assets.

General components
- Risks insurance.
- Marginal control.
- Double controlling.
- Internal checking.

3.2.2.3. Internal Control Process:

Some authors suggested many of the internal control steps, the researcher will cite one of them is (Kulkarni, 2002) who has suggested the following steps:\(^67\):

1. Establishment of certain standards: For controlling, two things are essential: actual performance and some set of standards to compare. Standards can be defined as the established criteria against which actual performances or results can be measured.
2. Measurement of performance: in this step, actual performance is measured in terms of unit fixed. When standards are set in numerical terms, performance can be measured accurately.
3. Comparison of actual performance with set standards: it helps to determine the degree of variations between actual performance and the standard.
4. Taking the corrective actions: when the nature of variation and causes of variation become clear, necessary actions are expected. Many times by taking temporary corrective action immediately, temporarily problem is solved but the other method is more effective. Considering the causes of variations, efforts can be made to remove the causes permanently.

3.2.2.4. Internal Control Significant:

Internal control failures could be disastrous. In 1995, Baring Bank suffered from a $1.3 billion loss and collapsed subsequently. The bank's downfall was brought by its trader (Nick Leeson), Apparently, there was no internal control to monitor Leeson's activities. Baring's management was unaware of Leeson persistently acting beyond his authority. In its investigation of Baring's collapse, the Bank of England attributed

Lesson’s unauthorized trading activities to the absence of effective internal controls. A satisfactory level of internal controls could have mitigated such fatality.\textsuperscript{68}

When properly implemented, internal controls can provide reasonable assurance that an entity will achieve its objectives of safeguarding assets, maintaining accurate and reliable accounting data, promoting operational efficiency, and adhering to prescribed managerial policies.

Rapid adoption of Information Technology (IT) by businesses has not changed the basic need for internal controls. However, the integration of IT into business processes extends the role of IT systems and IT-based internal controls. Recognizing that IT can have a significant effect on internal controls and the manner in which an audit should be conducted, the AICPA Auditing Standards Board (ASB) in April 2001 issued SAS No. 94 "The Effect of Information Technology on the Auditor’s Consideration of Internal Control in a Financial Statement Audit."\textsuperscript{69}

(SAS No. 94, 2001) is intended to provide guidance on the effects of IT on internal controls and on the auditor’s understanding of internal controls and assessment of control risk.

Some studies have discussed the relation between administration favorites of effective internal control systems and fraud commitments. The results showed the administration favorites the weak internal control system when they have intent to commit frauds, because of easing to cover up the frauds.

\textsuperscript{68}Tam, Kinsun “Implementing internal accounting controls as constraints in RDBMS and XML” School of Business University of Albany, State University of New York, USA. Paper submitted to the European Accounting Information Systems Conference 2002, Copenhagen Business School, 23-24th April.

Establishing and maintaining an appropriate internal control system is typically considered necessary to ensure relevant, reliable accounting information.

3.2.2.5. Objectives of the Internal Control:

In general, the accounting system goal to produce the clear, accuracy information and protecting the enterprise assets. Therefore, the existence of the internal control techniques and its conditions are considered important goal of the good accounting system.

COSO Committee, it is one of committees’ emergent of AICPA and emergent of Trade Way Committee also, in September 1992 issued report. That report under title: (Internal control – Integrated framework) considered the COSO’s report of the important reports contributed to the internal control.

The internal control consider one of the basic of the managerial process, it is management’s responsible. The management can delegate other persons in some controlling authority as the internal controller, or external controller. However, the final responsibility remains management responsibility.

(Hermanson; Hermanson, 1994)\(^70\) has listed the primary objectives of internal control as provided by the Institute of Internal Auditors. The purpose of these objectives is to provide reasonable assurance of:

1. Reliability and integrity of information.
2. Compliance with policies plans and laws.
3. Safeguarding assets.
4. Efficient use of resources.

5. Accomplishment of goals.

(Al-Rawi, 2002) has mentioned internal control objectives as follow:

1. Protecting the different assets of the organization.
2. Assure the data accuracy.
3. Increase the production efficiency.
4. Encourage the adhering of the managerial policies.

The internal control objectives are summarized as follow:

1. Protecting the assets: means protect all the fix and current assets, to confirm that, by verifying the booking values with physical assets.
3. Adhering of managerial policies: organization objectives interpreted to set of policies, plans and complete processes that cover all business sides in the organization.

3.2.2.6. The Controlling Techniques:

In 1974, American Institute of Certified Public Accounts (AICPA) issued auditing standards bulletin, defined the controlling techniques on the application.

The controlling techniques specialize in apply special functions, achieving by the department of the data operating, aim to ensure integrity of the data recording, data process and preparing the reports. Actually, the internal control objectives are same in manual and electronic systems, the following factors should consider during design the ideal accounting control systems:

1. Authority of the approval or refuse the procedures.
2. Accuracy and comprehension of the data.

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3. Accuracy and comprehension of the data process.
4. Specify the right time in the inputs, process, and outputs.
5. Protect the inputs, outputs, and computer files.
6. Protect the computer system and its equipment.
7. The efficiency and costing.

Those factors consider the technical objectives for controlling techniques in the applications using the electronic accounting information systems. Almost controlling techniques consider precautionary, designed to detect the errors. Under the electronic systems, waste the sharpness, vision and human judgments.

1. The Controlling Techniques under Electronic Systems:

Firstly; the separation between the functions: should distribute the functions, specified the duties and authorities to every person in the system as it is in the manual systems.

Secondly; existence the right system to operate the data, should define the rules to implement the processes in electronic systems according to the following basics:

1. Authority of approval or refuse the procedures should remain under supervises of the consider department.

2. The dialogue with the terminal station: the dialogue between the computerized system and the operator objectives to know the operator and receive the inputs.

3. Protecting the data of lose by backing up the main file.

Thirdly; the right records and vouchers.

Fourthly; the employees’ efficiency and honest, it plays great role under the electronic systems more than the manual systems because of the fast process and sequence; it
enables the dishonest employee to act difficulties and embezzlement more than the existence in the manual systems.  

2. Policies of Using and Training the Human Resources:

Considers the attracting of the competent and honest employees, one of the important components of the internal control, contribute to success of internal control system.

The competent employee is the most capability to accomplish the business and duties fast and by the minimize errors, contribute in increase data accuracy and raising productivity efficiency. The honest employee is the most devoted in maintaining the organization assets.

To enhance deeply creating the employees role in enhancing the internal control, the organization put set of procedures and policies as the following:

1. Should put menu of required qualifications for every job in the managerial hierarchy reflecting the responsibility amount relate to that duty as experience, certificate, intelligence, personality and the leader ability.

2. Should separate between the employees duties, through clear and confidence working index, illustrated the responsibility about every step of work implementing steps in organization.

3. Direct control and supervise in employees’ performance though the qualified supervisors, for ensuring if employees have implemented their duties and responsibilities.

4. Transfer the duties between the employees; grant the compulsory vacations, which this process allows to the employees to check other employees’ work.

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5. Double control through assign two of employees to implement the same duty, which every employee check the duty of other employee, this process should done only in case of the high value process, because it means repeat of duty.

6. Raising the employees and workers efficiency to operate the system though the training programs and courses that are necessary to illustrate the conflicts points in the system, and put the specific and clear illustrations, to available the fast achieve of system duties, and produce the data in accuracy and fast required by the lowest cost.

3.2.2.7. AIS and Control:

In any accounting information system, some form of controls are required to prevent and detect errors, and prevent and detect both accidental and intentional loss of assets and information. Over time, manual accounting systems developed well established controls and security methods to realize these ends that were often based in segregation of duties, comparison of documents and repeated checking of totals. With the proliferation of mainframe accounting systems, these controls were adapted to the centralized, automated environment of data processing. The new technology of the 1990's, however, distributes information ownership and processing to all possible users, both within and without the organization. Further, fewer and fewer paper documents exist as organizations migrate to computer media. Technology has influenced the business environment in three significant ways.

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1. It has increased our ability to capture, store, analyze, and process tremendous amounts of data and information, as well as changing production and service processes. This has empowered the business decision-maker greatly.

2. Technology has significantly influenced the control process. While control objectives have remained fairly constant, except for some that are technology specific, technology has altered the way in which systems should be controlled. Safeguarding assets, as a control objective, remains the same whether manual or automated. However, the manner by which we meet the control objective is certainly impacted.

3. Technology has impacted the auditing profession in terms of the Knowledge required drawing conclusions and the skills to perform an audit.

The periodic audits either external or internal of the accounting information system considered the final security method for the newer technology. Whether the audit is performed by external auditors or internal auditors, a regular review of internal controls and security methods should be conducted with an eye toward improving the existing system.