



**Comparison of Financial Performances of IT
Companies using Accounting Data**

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Comparison of Financial Performances of IT Companies using Accounting Data

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THESIS APPROVAL PAGE

I certify that in my opinion the thesis submitted by **Nashwan Ghazi ALDOURY** titled “**Comparison of Financial Performances of IT Companies using Accounting Data**” is fully adequate in scope and in quality as a thesis for the degree of Master Degree.

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This thesis is accepted by the examining committee with a unanimous vote in the Department of Finance and Islamic Banking as a Master of Science thesis. 30\09\2020

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The degree of Master of Science by the thesis submitted is approved by the Administrative Board of the Institute of Graduate Programs, Karabuk University.

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DECLARATION

I hereby declare that this thesis is the result of my own work and all information included has been obtained and expounded in accordance with the academic rules and ethical policy specified by the institute. Besides, I declare that all the statements, results, materials, not original to this thesis have been cited and referenced literally.

Without being bound by a particular time, I accept all moral and legal consequences of any detection contrary to the aforementioned statement.

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Signature :

DOĞRULUK BEYANI

Yüksek lisans tezi olarak sunduğum bu çalışmayı bilimsel ahlak ve geleneklere aykırı herhangi bir yola tevessül etmeden yazdığımı, araştırmamı yaparken hangi tür alıntıların intihal kusuru sayılacağını bildiğimi, intihal kusuru sayılabilecek herhangi bir bölüme araştırmamda yer vermediğimi, yararlandığım eserlerin kaynakçada gösterilenlerden oluştuğunu ve bu eserlere metin içerisinde uygun şekilde atıf yapıldığını beyan ederim.

Enstitü tarafından belli bir zamana bağlı olmaksızın, tezimle ilgili yaptığım bu beyana aykırı bir durumun saptanması durumunda, ortaya çıkacak ahlaki ve hukuki tüm sonuçlara katlanmayı kabul ederim.

Adı Soyadı: Nashwan Ghazi ALDOURY

İmza :

FOREWORD

This thesis consisted of the introduction, conclusion and three chapters, the first chapter dealt with the general conceptual framework and historical development of accounting science, the most important accounting association in the world, the concept and principles of accounting, accounting information systems, its elements and factors affecting its efficiency, and accounting financial statements, their importance, aim and users.

The second chapter dealt with the analysis of the accounting data, methods and techniques used in this analysis, and the separation of vertical and horizontal analysis processes, analysis of activity ratios, profitability ratios and debt ratio.

In the third chapter, the TOPSIS theory was explained, and the accounting financial statements were analyzed for 15 of the companies listed on the ISIM list according to the TOPSIS theory and analyzed the results.

First, thanks to Allah Almighty for giving me the courage and power to accomplish this research.

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ABSTRACT

IT industry with high added value has visible contribution to GDP of countries. On the other hand, the IT sector is one of the sectors that need large amounts of funds. One of the most important criteria in reaching funds is financial performance. The purpose of this study is to rank the financial performances of IT companies by using accounting data. The other purpose of this study is to reveal the financial structures of financially successful IT companies. In this thesis, fifteen IT companies listed in Istanbul Stock Exchange Technology Index (XUTEK) are examined for three-year time period between 2017 and 2019. The companies were ranked by their ranking index scores calculated via TOPSIS method. It is believed that this study will provide information to lenders, investors, and policy wonk institutions.

Keywords: Accounting Data, Ratio Analysis, Financial Performance, TOPSIS.

ÖZ

Yüksek katma değer yaratma yeteneğine sahip bilgi teknolojileri (BT) sektörü, ülkelerin GSYİH'na önemli katkılar sunmaktadır. Bununla birlikte BT sektörü, yüksek tutarlı fonlara ihtiyaç duymaktadır. Fonlara ulaşma kolaylığı noktasında en önemli kriterlerden bir tanesi finansal performanstır. Bu çalışmanın amacı, muhasebe verilerini kullanarak BT şirketlerinin finansal performanslarını sıralamaktır. Bu çalışmanın bir diğer amacı ise finansal açıdan başarılı BT şirketlerinin finansal yapılarını ortaya çıkarmaktır. Bu çalışmada, Borsa İstanbul Teknoloji Endeksi'nde (XUTEK) işlem gören on beş BT şirketi, 2017-2019 yılları arasındaki üç yıllık dönem için incelenmiştir. Şirketlerin finansal performansları, TOPSIS yöntemi yardımıyla hesaplanan sıralama endeksi puanlarına göre sıralanmıştır. Bu çalışmanın kredi verenlere, yatırımcılara ve politika yapmayan kurumlara bilgi sağlayacağına inanılmaktadır.

Anahtar Kelimeler: Muhasebe Verisi, Oran Analizi, Finansal Performans, TOPSIS.

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ARŞİV KAYIT BİLGİLERİ

Tezin Adı	Muhasebe Verilerini Kullanan BT Şirketlerinin Finansal Performanslarının Karşılaştırılması
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ABBREVIATIONS

TOPSIS: Technique for Order Preference by Similarity to Ideal Solution.

IT: Information Technology.

GDP: Gross domestic product.

ISE: Istanbul Stock Exchange.

ICAEW: Institute of Chartered Accountants in England and Wales.

FASB: Financial Accounting Standards Board.

GAAP: Generally Accepted Accounting Principles.

AAA: American Accounting Association.

IASC: International Accounting Standards Committee.

IFAC: International Federation of Accountants IFAC.

AICPA: American Institute of Certified Public Accountants.

XUTEK: Istanbul Stock Exchange Technology Index.

KAP: Kamuyu Aydınlatma Platformu.

COMPARISON OF FINANCIAL PERFORMANCES OF IT COMPANIES USING ACCOUNTING DATA

PURPOSE AND IMPORTANCE OF THE RESEARCH

Financial statements are one of the most important tools that companies use for transparency. Preparing financial statements in accordance with generally accepted accounting standards helps various interest groups to have a clear idea about companies. With the help of various financial analysis methods, interest groups can have an idea about the financial performance of companies. The purpose of this study is to explain how financial performance of companies could be ranked by using accounting data.

Information Technology (IT) is one such sector which gained its growth momentum during latest periods. IT industry with high added value has visible contribution to GDP of countries. Today this is the sector which is attracting major foreign investors to invest their money in Turkey. The major criteria for investment are outstanding financial performance. IT companies are generally in the establishment phase. Therefore, their funding needs are higher than other sectors. Financial performance is one of the determining criteria for fund raising. This study is considered important in terms of showing how creditors, investors and stakeholders can measure financial performance through accounting data.

METHOD OF THE RESEARCH

The aim of this study is to compare the financial performance of technology companies by using accounting data. In order to make comparisons, multi-criteria decision-making techniques were used in the study. There are several multi-criteria decision-making techniques in literature. Technique for Order Preference by Similarity to Ideal Solution Methods (TOPSIS) is the most used method in the literature for financial performance comparison. In accordance with the literature, the TOPSIS method is used in this thesis.

In this thesis, fifteen technology companies listed in Istanbul Stock Exchange (ISE) are examined for three-year time period between 2017 and 2019. Firstly, eight financial ratios are calculated using accounting data in financial reports for each year. Then, the financial performance scores of the companies are calculated using the TOPSIS method for each year. Different from the previous studies, we calculated ranking index score for each company and each year. Finally, the companies analyzed in study were ranked by their ranking index scores.

SCOPE AND LIMITATIONS / DIFFICULTIES

In this thesis, the data consists of fifteen IT companies which are listed in Istanbul Stock Exchange Technology Index (XUTEK). The period of study is from year 2017 until 2019. The sample size is limited to 15 companies and only secondary data is used; thus, the study has inbuilt the limitations of secondary data. The period of study was limited to three years.

In this thesis, eight financial ratios are used. Financial performance scores are calculated according to eight financial ratios. If any study uses different financial ratios, different results could be obtained.

1. CHAPTER ONE: CONCEPTUAL FRAMEWORK

Since the beginning of history, man has been keen to satisfy his desires and to meet his economic and social needs and sought in the earth looking for everything that achieves his goals. He discovered multiple and varied sciences that had a great impact on the development and progress of mankind.

Accounting is a branch of social science that has played a prominent role in the preservation of rights and the guardianship and protection of interests. Like many other branches of knowledge, the concept of accounting has evolved as a result of multiple developments in the scientific fields to become an integrated system for the production and delivery of information, which led to increased effectiveness in the service of groups and beneficiaries.

The accounting system is one of the main components of management information systems and includes all activities and processes which aimed at producing and communicating information to its internal and external users in various fields. In the light of the technical revolution we live today, the accounting system is one of the most important systems producing information which are useful in making economic decisions that affect the welfare of the individual and society. The accounting system is based on a set of basic components and distinguished by a set of characteristics that contribute to the production of accounting information with high quality and they are appropriate to the needs of different users. The information is produced in the accounting system in a series of stages and successive steps and governed by a set of basic considerations for each stage, as the process of producing accounting information is subject to a set of internal and external factors and influences, such as economic, political, social, cultural, legislative and other factors (Weled Siam, 1995, p. 2).

At present, accounting information is an important asset, as optimal control and utilization make it profitable and successful for future and ensure the continuity and development of companies and institutions. The accounting information system is part of the total information system. This system plays an important and effective role in providing the different levels of decision-making with timely, ready, correct and accurate information that helps them in making management decisions. This

information is provided through reports and lists that are based on actual daily data (Al-Ammari, 2004, p. 132).

The aim of the accounting system is to produce accurate and timely reports to help decision makers make good decisions. Accounting is considered as an information system in its raw form (financial statements) (Ahmed Juma, 2003, p. 3). Accounting also plays a role in the transfer of financial data to produce the information necessary to make various management decisions, and the accounting system has turned to be an information system that does not stop at the limits of financial data and information, but exceeded to include quantitative and descriptive data and information benefit the decision maker and users with multiplicity and diversity.

As a result, the accounting information system now provides additional information in addition to financial information such as:

- A- Provide timely and accurate quantitative and financial data and information.
- B- Increased validation of external information for planning purposes.
- C- Amendment in the reports submitted to the Department under inflation.

It should be noted that there is an urgent need to provide accounting information necessary for many parties to make their various decisions, whether directed to an internal or external destination, which is called the group of users of financial statements and the most important element is management, which is responsible for the preparation of these financial statements and then presented. This information must be able to achieve the goal for which it was prepared.

1.1. Historical Development of Accounting and Accounting Organizations

The emergence and development of accounting was the result of economic, legal and social conditions, and with the change and development of these circumstances, accounting was evolved, and other branches emerged, including: Management, financial, national or governmental, and analytical accounting. Given the importance of these circumstances, we mention the following (Aldalahmh, 2008, p. 9):

- 1- Economic conditions: The development in the economies of the countries makes accounting in line with it.

- 2- Social conditions: The customs and traditions will be reflected in accounting practices, for example, the European culture requires the state to follow strict accounting to prevent the manipulation of money and evasion of taxes, while poor African countries simply adopt a simple accounting.

The development of accounting has gone through several stages since ancient times. Accounting studies proved that the first attempt by man to record financial information in Mesopotamia dates back to the Assyrian era in 3500 BC, as their kings were keen to record what they were paying their soldiers in the form of cattle or grain. Also, the invention of cuneiform writing about 2900 BC by the Sumerians was to administer the funds of economic establishments belonging to religious temples (Hanan R. , 2003, p. 12). They developed a hexagonal number system that gives different values according to houses, which developed arithmetic and make accounting verification Possible by writing on the boards.

The accounting of Egyptians in the time of the Pharaohs was more sophisticated and the economic system more centralized. It has developed the management of grain silos which were deployed in that system and management of the pharaohs' coffers and made it an elaborate system for stores' accounting. Writing on the papyrus helped for accounting verification.

The significance of registration was shown during the Islamic era through the urging of The Holly Qur'an to record the debt (Belgit, 2004, p. 17) as the prophet Muhammad (PUH)) used to reckon with the agents he sends to collect alms tax (Zakat) and hold them accountable for the land tax and the expense. The Islamic State's expansion had a great role to increase the attention of the Muslim Caliphs on accounting, as the records were established, and the vessels of alms and land tax were expanded. These sums of money were calculated on the basis of the imports of the Islamic treasury (Beit Almal), particularly during the Ottoman Caliphate era which witnessed a remarkable development in accounting and management. This is the first stage of the development of accounting.

In the second stage of accounting development during the period 1494-1800, the Italian mathematician Luca Bachello emerged, where he gave a detailed description of the double-entry system as the basis for bookkeeping in his famous book

(Overview of Arithmetic, Geometry and Descent), an inevitable reflection of those economic conditions that Italy knew as a world trade center. Bachello's attempt was regarded as a birth certificate for accounting in its current form, as three records were created for daily registration by double-entry method (Belgit, 2004, p. 17):

- 1- Notebook: All daily transactions carried out by the trader are recorded without analyzing the nature of these operations.
- 2- Daybook: All the transactions carried out by the trader are recorded according to their nature, whether they are credit or debit, and arranged chronologically according to the date of occurrence.
- 3- Ledger: Accounts that are registered on a daily basis are transferred to it and shall be credited by subtracting the debit party from the creditor party for each account in order to extract the balance.

The third stage of accounting' development between 1801 to 1955 is the most important, where the emergence of the modern industrial revolution in Europe, the emergence of large enterprises, the spread of railways, and the emergence of income taxes in the organized legislative form, which had a clear impact on the beginning of the transition from bookkeeping to the computer. Perhaps the most important reasons behind the development of accounting were the great and growing demand for funds that were needed to finance the requirements of the industrial revolution, modernizing the means and methods of manufacturing, the acquisition of new materials, tools and manufacturing machines, which in fact, due to the scarcity of funding sources, led to resort to stock companies which their shares were sold to individuals, so that the small enterprise is no longer in line with the development necessitated by the conditions of the industrial revolution.

This period witnessed an increasing expansion in the shareholding companies, which necessitated the separation of the management, which led to the recognition of the legal personality of the company and the transfer of importance from the point of view of the owners of the project to the management point of view, and became seen as assets belonging to the unit and the debts were burdens on it not on others. Profit belongs to the Company and is considered an element of its property. The profits are not owned by the shareholders unless it is decided to be distributed.

The spread of shareholding companies has also had a clear impact on accounting professionally. In most countries of the world, governments interfered to issue legislations which secure a minimum amount of information to be revealed to the external parties, the shareholders, and the borrowers in particular. It was normal for an accountant to meet the information needed for the external parties to direct their investments. Not only that, but it became necessary to review the financial statements published by the joint stock companies by the external auditor in order to assess the reliability of the information provided by management in these statements. Hence the emergence of the accounting profession and the required renewal of the assets of the audit and ethics of the profession.

In 1854, the Society of Accountants was established in Scotland, followed by the Society of Accountants and Auditors in England in 1880, and the American Association of Public Accountants in 1887.

Institute of Chartered Accountants in England and Wales founded as a federation of Scottish and English accounting societies in 1880 in London, UK, the institute is shortened to ICAEW and its importance is due to the dominance of its recommendations. In addition to the United Kingdom, it has associations of practicing accountants in Australia, New Zealand, India, Pakistan and many countries of the Near and Far East and some African countries. From 1938 to present, the Institute publishes monthly periodicals in the name of the profession of accountants. It also issues bulletins entitled (Recommendations on Accounting Principles).

American Institute of Certified Public Accountants, it is a professional organization for certified accountants practicing the accounting and auditing profession. It was founded in 1887 and has been publishing since 1905 a monthly periodical named (Journal of Accounting Profession) through which it deals with accounting problems of the members and their solutions. The Institute has two committees whose task is to issue statements adopted by the members as a guide if they do not contradict the instructions of the Financial Accounting Standards Board (FASB). These two committees are: The Executive Committee on Accounting Standards (concerned with Cost and Financial Accounting) and the Audit Standards Committee.

Since its establishment, the Institute has shown great interest in the development of accounting principles. At the end of the global economic crisis in the 1930s and the prevalence of accounting methods to mislead the users of the resulting data, the Institute adopted the term "accepted accounting principles" in 1934. In the same year, the Institute adopted the term Generally Accepted Accounting Principles, symbolized by (GAAP), aims to standardize the practice of accounting, and make it compatible with changing economic and social conditions. In 1938, the Institute established the accounting procedures committee, which aims to categorize the areas of difference in accounting reports and statements, which led to the issuance of recommendations as "Accounting Research Publications", which publishes 51 papers to deal with various accounting processes and problems. Another committee, the Accounting Terminology Committee, which was established in 1949, presented four publications in the name of Accounting Terminology Bulletin, in an attempt to standardize the content of different accounting concepts.

American Accounting Association, AAA, a scientific organization comprising primarily accounting professors in universities, was established in 1916 and was called (American Association of Teachers of Accounting in Universities), where the current name was adopted in 1936. The Association publishes a quarterly journal called Accounting Journal since 1926.

The fourth stage of the development of accounting, which extends from 1956 to the present is characterized by the emergence of many studies on the theory of accounting, and then emerged other distinguished writings at this stage concerned with the problem of low purchasing power. This stage can also be described as the stage of rapid progress in accounting, as a result of methods Operations research, statistical methods and computer, general behaviorism, the approach of the international systems and standards of accounting, and multinational companies, which was the result of the breadth of the field of study in accounting theory.

This phase has witnessed the emergence of a number of international accounting bodies, including:

International Accounting Standards Committee (IASC), It was founded in 1973, following the agreement of various associations and institutes in different

countries (Japan, Australia, France, Canada, Mexico, Netherlands, United Kingdom, Ireland (Talha, 2007, p. 19). The Committee represents 104 professional accounting institutions from 78 countries. It is the only independent body entrusted by the professional accounting institutions members with the responsibility and authority to issue international accounting standards. The committee is managed by a council comprising representatives of 13 countries (Fromme Mohamed Saleh, 2010, p. 3).

International Federation of Accountants (IFAC), it is an independent voluntary organization based in New York, with 79 members of professional accounting organizations, belong to 57 countries. It came into being as a result of the initiatives introduced in 1973 and approved by the annual conference of accountants held in Munich in 1977. The Union is interested in developing and improving the accounting profession in the world with homogeneous standards. It is able to provide high quality services to the public interest, and the work program of the Union is implemented through the following technical committees:

- A- Education Committee.
- B- Behavior Committee.
- C- Financial and Administrative Accounting Committee.
- D- Purification of Information Committee.

1.2 Accounting Concept

The rapid development of economic and social systems led to the emergence of new sciences after the Second World War, which gave accounting a leading role in directing economic activity and urged many concerned in the scientific and practical fields to develop accounting.

Today, accounting has a fundamental role to play in the management of economic establishments and in providing the necessary information in objective decision-making (Radwan, 1998, p. 27).

The accounting function has evolved, and its objectives have expanded with the development of economic and technological activity. It no longer seeks to show the results of the business activities, but expanded its functions to include the organization of the flow of funds, planning, control, and decision-making management to choose

the optimal alternative that achieves the objectives of opposing parties in the establishment, in addition to providing information (Abdulrahim, 2014, p. 21).

Accounting is one of the main components of any organization, whether it is for profit, such as commercial establishments or non-profit, such as government units. Without accounting, it is not possible for these organizations to precisely know the financial situation at the end of each financial year which enables the decision-makers to take right economic decisions. Accounting in general is an information system that produces information that is appropriate for economic decision-making purposes.

Those who wish to define accounting must look for appropriate aspects of what accounting is, so in 1966, the American Accounting Association defined accounting as: “the process of diagnosing, measuring and communicating economic information (financial) in a way that enables the relevant parties to judge financial matters and make appropriate decisions about them” (Al-Khadash, 2004, p. 15).

As defined by the American Institute of Chartered Accountants in Accounting Bulletin No. 4 in 1970 as: “A service activity whose function is to provide quantitative accounting information of a financial nature essentially for a particular enterprise which is intended to be useful to those concerned in making good economic decisions” (Al-Khadash, 2004, p. 16).

(Shahin, 2003, p. 17) defined it as “an information system that processes the financial statements of an accounting unit in order to produce information that is useful to the user in making a decision.”

The mediator of the previous definitions of accounting shows several things:

- A- Accounting is the art of how operations are recorded, classified, summarized and posted to the accounts and the preparation of results.
- B- The accounting science has its principles, theories, concepts, assumptions and rules of work are generally known and accepted by all.
- C- Accounting is a science used in all types and times of activities in order to achieve justice and preserve the rights of all parties with common interests at a certain time and place.

Until the end of the first half of the twentieth century, accounting remained an art used to serve the scientific application of the accounting profession, as the accountant carried out works that related with the verification and recording events and the economic processes of a historical nature (Radwan, 1998, p. 137).

With the beginning of the second half of the twentieth century, accounting has seen increasing interest by professional organizations, as well as many researchers and scholars in the scientific and practical fields of accounting development (Matar M. , 2004, p. 17).

(Al-Shirazi, 1990, p. 15) stated that: "Accounting added a new functional dimension based on the objectives and behavioral effects sought by accounting as an information system, which is directly linked to the measurement and communication theories, and this link was reflected on the outputs of the accounting system represented in the financial statements and reports where accounting information has become increasingly important as a means to derive its importance and necessity from the extent of its contribution to decision-making processes, which are subject to all environmental indicators and variables such as market conditions, and the provision and optimization of various resource requirements that are assigned under risk and uncertainty" .

The researcher believes that there are many definitions but they all revolve in one axis, and there is no fixed and specific definition of accounting activity because of the multiplicity of its activities on the one hand and keep pace with all economic and technological developments on the other hand, and accounting in the modern concept is an information system as well as a tool to serve multiple parties within or outside the economic unit.

Accounting aims to provide financial information about the economic unit and this information in turn helps in the decision-making process, whether within or outside the economic unit.

1.3. Accounting Principles

Accounting is based on a set of generally accepted accounting principles (GAAP). The mission of these principles is to clarify the methods or procedures for

measuring the items of the financial statements in a manner that harmonizes the items of the various entities' lists. Thus, accounting principles are general guidelines for what an accountant should follow when measuring financial statement items and thus helps to solve accounting problems and is comprehensive, appropriate and usable in most economic projects.

In the United States, the Financial Accounting Standards Board (FASB) is primarily responsible for the preparation and development of accounting principles, presenting bulletins of financial accounting standards in conjunction with the analysis and explanation of these standards. As well as the Securities and Exchange Commission has the authority to oversee and control the financial and accounting disclosure of companies listed on the stock market, and this institution, after discussing and accepting the accounting principles that impose on the Financial Accounting Standards Board to issue accounting regulations for accounting issues which are not addressed by the Financial Accounting Standards Board.

Accounting principles can be defined as: Accounting principles refer to the set of accounting rules that an accountant should be familiar with and guided when practicing different accounting applications (Abdulrahim, 2014, p. 45).

A set of instructions, rules and guidelines to direct the accounting work in certain cases. When the accountants need solutions, they are referred to these principles and therefore can be said that the principles of accounting are a set of rules identified as a result of the professional application of accounting thought to achieve the process of accounting measurement and recording financial operations and the preparation of financial lists.

We conclude that the accounting principles are: General guidelines to be followed by the accountant in certain circumstances. They are man-made and evolved over the years to be used as a practical tool to help solve accounting problems and they are comprehensive, appropriate, and usable in most economic projects. What distinguishes these principles (unlike mathematical and scientific laws, they have not been scientifically derived); therefore, they can be constantly reviewed, modified, and revised to conform with the conditions of the economic environment surrounding their

applications and uses. There are several accounting principles are recognized and the most important.

Historical Cost Principle, This principle is considered one of the most important principles upon which the accounting model is based in evaluating the elements of assets and liabilities, where all elements of the economic resources are valued with their usage, sources of funding, and all the expenditures and revenues which are represented in the financial statements with their original cost, and regardless of the changes exposed to the economic value of the asset as a result of changes in the purchasing power of money because these changes make the accounting statements presented in the financial statements in different periods inappropriate for time and spatial comparisons. Long-term assets (land, buildings, machinery, furniture, transportation, etc.) are the most affected elements in this principle. This is due to the use of historical cost in the valuation of these assets (Donaldkiso, 1988, p. 386):

- A- It represents the true cost at the time of acquisition of the asset.
- B- It is the result of a process of exchange of fact and not hypothetical and therefore, it is unreliable.
- C- When other methods of valuation are used that result in gains or losses, they should not be taken into consideration as long as the asset is in the possession of the economic unit.

The cost of a long-term asset is included in all costs incurred in cash or in kind to acquire it, whether through purchase or internal production. In the case of purchase, all procurement expenses and the necessary expenses incurred until the asset becomes the property of the economic unit. In the case of production of the asset within the economic unit, here the cost of the asset includes all the expenses necessary to produce it until it is ready for use.

Principle of Objectivity, this principle is intended to ascertain, by any material means, the occurrence of a financial incident. The accounting documents are considered a sufficient written evidence for the occurrence of the incident. Therefore, accounting does not recognize financial transactions and does not record any event in the accounting records without documentation confirming the occurrence of each transaction individually, and documentation includes all elements of assets and

liabilities without exception. In most cases, the principle of objectivity is synonymous with the principle of verification, as there is no essential difference between these two principles, and of course, this is resulted from the avoidance of accounting to estimate, predict, or rely on personal judgment.

Periodicity Time Principle, This principle means the continuation of the project in the exercise of its activities without regard to the normal age of the owners until the objectives and plans of the accounting unit are achieved separately from the plans and objectives of the owners until the actual liquidation. Having considered the principle of the periodicity time one of the fundamental principles that contributed to the solution of the problem between the desire of the project owners to know the result of the work of the project profit or loss at certain periodical times rather than waiting until the final liquidation of the project. This principle was based on a theoretical concept of the life of the project, whereby the project is divided into time periods varying from establishment to another, but it is usually a full calendar year starting from 1-1 and ending on 31-12 of each year where the establishment is founded in a recordable state on the first of each year and then liquidated at the end of the year, then a new establishment is founded at the beginning of the year to be filtered again and so the process of theoretical construction and liquidation continues until it is actually liquidated (Al-Heyali, 2007, p. 67).

From the above we can determine the practical procedures in practice through the following steps:

- A- Prove what the owner actually contributes from the capital of the project in the daybook, and apply it to the opening entry until the first step is accountingly registered for the birth of the project by making what the owners contributed of money as debtor and the capital as creditor.
- B- The process of posting accounts from the daybook to the accounts of the general ledger at the end of the first accounting period with the process of balancing the accounts.
- C- Preparation of the balance of the audit to ensure the validity of the verification in the daybook and posting to the account of the ledger.

- D- Reconciliation adjustments after the actual inventory count at the end of the first period.
- E- Prepare the income statement to determine the net profit or net loss of the project for the first period after closing all the balances of the accounts shown in the audit balance.
- F- Prepare the financial position list to determine the financial position at the end of the first period.

Through these steps, the financial statements prepared at the end of the first period become the basis on which the accountant conducts the opening entry at the beginning of the second accounting period. Where the accountant proves the opening entry for the second year as if he is creating a new project and this entry is called in the second period the reverse entry .We can show the principle of periodicity as follows:

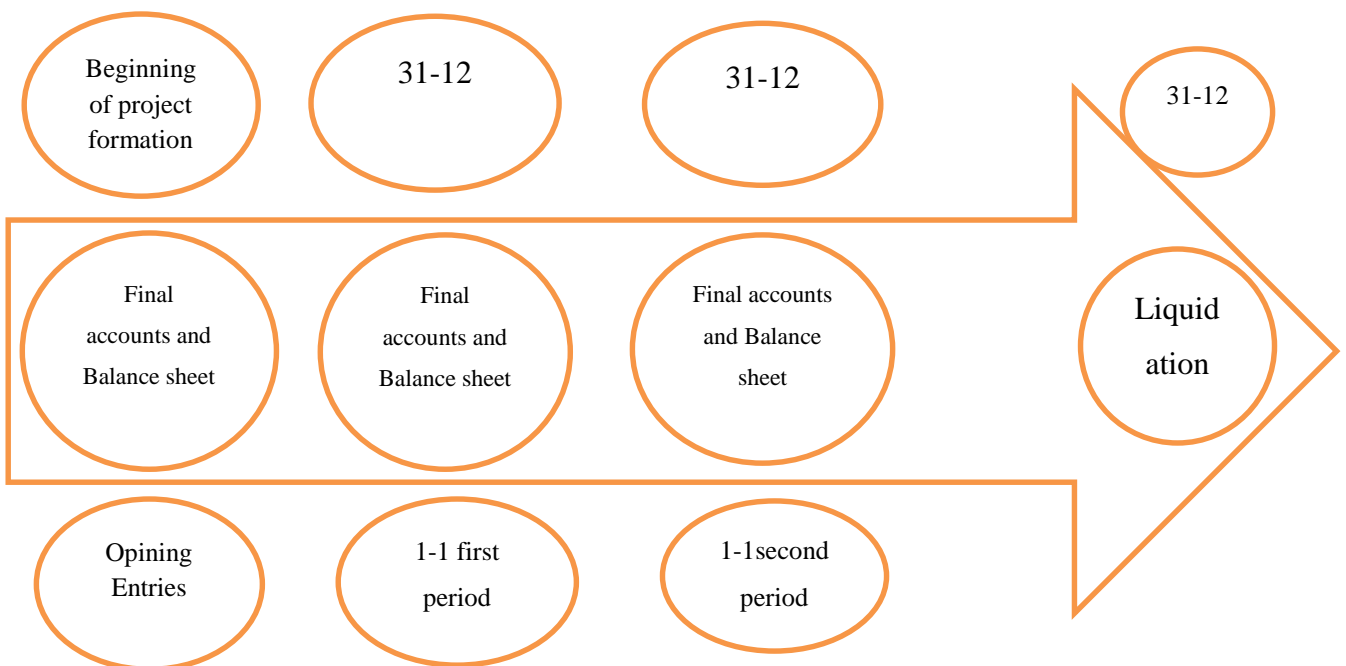


Figure 1: The Principle of Periodicity

Revenue Recognition Principle, It is known that the income of each accounting period is matched with the expenses of the same period in accordance with the principle of revenue matching expenses, if the revenue is greater than expenses, and in accordance with the principle of revenue recognition there must be an event that can be

relied upon as a criterion of revenue recognition to be able to recognize this Revenue in record. While the accountants' points of view differ on the criteria for the recognition of revenue, the most likely opinion is that revenue is achieved once the goods are sold or the service is provided. This opinion is considered a basic rule for revenue recognition, whether the sale of cash or sale (on time) on the account which is supported by a commercial paper under the item (liabilities).

In addition to the recognition of revenue under the sale of goods or the provision of service there are other cases where revenue is considered verified:

Revenue Recognition After Sale: Revenue after sale is achieved in some cases, as in installments where the seller sells the goods to the buyer and the price is paid in installments. Under this type of sale, the ownership of the goods is transferred to the buyer as soon as the transaction is completed and the goods arrive at the stores of the buyer regardless of the remaining amount which the buyer owes (Al-Heyali, 2007, p. 74).

Revenue Recognition At The Completion of Production: Revenue can be considered as soon as the production is finished, especially when it is possible to estimate the price of the sale objectively, and this rule endorsed the recommendations issued by the American Institute of Certified Public Accountants (AICPA) which stated: It can be exceptionally proved that the commodity inventory at a price is higher than its cost. If the stock, for example, is made up of precious metals with a fixed monetary value, and the distribution requires substantial selling expenses, then the high cash value of this stock may be established. The basis used to justify this rule must be based on:

- 1- the cost of inventory cannot be determined with a reasonable degree of accuracy.
- 2- the possibility of marketing the stock at the specified prices in the market in a short period.

We can see from the above that the principle of revenue can be applied after the completion of production if the following conditions are met:

- 1-** The possibility of calculating the cost of production with a high degree of accuracy.

- 2- The possibility of calculating the sale price objectively.
- 3- When the product is typical.
- 4- When there is a regular and proven market for the product.

Where the previous rule can be applied in some industries related to mines for diamonds, silver and gold as well as the mining industry and oil wells.

Revenue is realized during the production process: The production cycle varies from one industry to another, depending on the nature of the product. While there are industries whose production cycle lasts less than one accounting period, there are other types whose production cycle is longer than one accounting period; therefore, the industries of the first type (its production cycle is less than one accounting period) are not characterized by any accounting problems in terms of the distribution of costs and revenues over accounting periods. However, the situation differs in industries whose production cycle takes more than one accounting period, especially in cases where the revenue is achieved gradually and according to the stages of production and the level of completion, as in the case of long-term construction contracts, which are executed over multiple accounting periods due to the asynchronization of the depletion of its expenses and its achieved revenue during the same accounting period. It is also worse from the aspect of expenditure. Long-term construction contracts are accounted for under two main methods (Mohamed Matar, 1994, pp. 17-18): the completed contract method and the percentage of completion method. Although generally accepted accounting principles leave the contractor free to whichever he chooses, the American Accounting Principles Committee issued in 1981 an accounting statement that favors the percentage of completion method. According to this method, the revenue of the contract is allocated to the accounting periods that witnessed in its implementation, and thus it is consistent with the value of the work performed during each period where part of the contract expenses, revenues and profits are recognized under the percentage of completion over the accounting periods according to the percentage of completion.

Achieving revenues upon completion of the economic activity of the production process: This standard is intended to be achieved and recorded at the time when the largest economic activity is accomplished whenever this activity can be measured and verified without bias.

Revenue recognition rule upon completion of the main economic activity of the production process can be applied in the following cases (Hanan M. R., 1987, p. 201):

- A- When production is based on customer requests, the sales price is pre-set and the cost of production can be determined.
- B- When the selling price is competitive in a fully competitive market, the entire production can be discharged in a short time without reducing the price.

The principle of matching revenue to expenditure that is, after determining the income of the accounting period, the expenses associated with those revenues should be deducted from them to reach the net income for that period, and therefore the result of the business will be a profit if the revenues generated during the period exceeds the value of the expenses associated with it. A loss is made if the generated revenues are less than the expenditures (Enas, 2017, p. 37). According to the contemporary accounting model, income is determined on the basis of the principle of matching revenues to expenses, since the interest of users of financial statements is not limited to the amount of income earned by the enterprise during a certain period, but extends to the need to know the sources of those incomes, their components, the events, processes, and conditions that led to the achievement, this information is very important in forming expectations about the future (Al-Shirazi, 1990, p. 280).

The principle of relative importance, This principle is closely related to the principle of full disclosure, which requires full disclosure of the data of the financial process that affect the outcome of the economic unit and its financial position, that the principle of relative importance means giving the greatest possible importance to the important elements that have a greater impact than others on various financial statements. However, theoretically, all elements, whether their economic significance is large or small, should be treated in the same way. However, in practice, the rule of universal importance of all elements is often neglected. For example, the cost of a machine represents relatively considerable significance. However, the cost of some office tools such as punch tool is low in comparison to the cost of the machine. In addition, the relative importance of the machine is not comparable to the relative importance of punch tool in terms of its usefulness to the economic unit. Therefore,

the cost of such instruments is not allocated to accounting periods, but it is considered as income expenditures on the period in which it was purchased.

The above understanding of the principle of relative importance indicates that some accounting procedures are subject to the opinion of the personal accountant in applying the relative importance to certain elements. This opinion is confirmed by the statement No. 4 issued in 1970 by the Accounting Principles Board of the American Institute of Certified Public Accountants (AICPA), which clarifies the concept of relative importance. According to (Al-Qadi, 1988, p. 81), from the previous statement, the following can be diagnosed:

- A- The statement did not provide an enough comprehensive definition of the relative importance in terms of identifying the accounting elements that are subject to the application of this principle, and when information can be considered important
- B- It is clear that the statement left the choice to the accountant or the auditor in determining the importance of using this principle, based on this ethics of the profession and the degree of scientific knowledge and practical experience.

Disclosure Principle, through this principle, the financial statements are not seen as an objective that the accounting unit seeks to achieve once these statements are prepared. But to help some internal and external parties to take various decisions, in addition to providing an element of control over the activity of the project by the owners, especially shareholding companies, which necessitated that the data and information expressed in the financial statements are clear, sufficient and understandable for all parties seeking to benefit from them.

From to the above, Schutzman argues that the purpose of the financial statements is as follows (Schutzman, 1963, p. 35): "It is a friendly means of communication with investors, a brochure with information of interest to employees, a catalog of company products, and useful economic information for the press that is interested in business affairs, a tool to strengthen the links between the project and the product in which it lives, a book fit to study in accounting and management classes, a means of communication to gain the trust of customers and suppliers, and an annual guide for sales people" .

Martmer Fox believes that the purposes of the financial statements are to "give management an opportunity to provide project owners with detailed information on what they do on their behalf and this helps in creating a spirit of understanding between management and owners to show good management intentions and what efforts they exert, thus to give an atmosphere of confidence that enables the administration to perform its duties in a flexible and entrepreneurial manner" (Fox, 1965, p. 39).

Principle of consistency, this principle is based on the fact that the accounting procedures, principles, methods and policies that are tested amongst several alternative procedures and methods must be followed consistently and regularly from one accounting period to another.

Consistency in the application of the principles, policies, methods and procedures over time from one accounting period to another will provide the possibility to compare the financial statements prepared during these periods in a way that serves its users. Thus, the stability feature allows to make different comparisons on the elements of financial statements, which reveals the changes that occur and the trends of these changes and the amount of their impact on the financial statements.

Therefore, the principle of stability includes (Al-Heyali, 2007, p. 86):

- A- Apply the same accounting procedures and methods to similar events in a single project during different accounting periods.
- B- The application of the same principles, policies and procedures for each element of the financial statements of the project during the previous accounting periods.

Dr. Sadiq Al-Hassani explained in the writing of financial and accounting analysis that "stability in the application of accounting principles, methods, and policies is very important and necessary before the use of financial statements for the purposes of financial analysis (especially when making comparisons) and the stability in the use of those principles, policies and methods leads to the sincerity of the significance of the lists. Changing those bases from year to year loses these indications and may be misleading to users of the data. Hence, some legislations oblige the auditor

to refer in his report to the extent of consistency in the use and application of accounting principles or the methods used from time to time. This obligation is one of the accepted auditing standards (Al-Hassani, 1994, p. 33). However, stability does not mean that certain accounting principles and procedures cannot be changed in the event that one or more reasons for the change exist. However, where there is a justification for the change, it should be indicated in the financial statements and the reasons for the change in the form of notes attached to the financial statements in coincidence with the principle of full disclosure.

The principle of reservation, According to this principle, some elements of the financial statements need some estimates, especially the elements of personal valuation, where it must take into account the principle of reservation and to avoid excessive exaggeration resulting from optimism in dealing with certain accounting matters. The basis of this principle in its application is to choose a policy that involves following an accounting procedure that takes into account possible future losses without profit. Perhaps the most important practical application of this principle is the valuation of commodity inventory at the end of the period at cost or market price whichever is lower, as well as the formation of provisions for precautions of the probable losses or contingent liabilities.

Many of the criticisms have been made against this principle (Hanan M. R., 1987, pp. 318-319):

- A- The principle of reservation shows a self-contradiction sometimes, it takes a pessimistic position when determining the income in a certain cycle by adopting the minimum market price of the last-term inventory, but this action will lead in the next cycle to a corresponding increase in profits the following year, and this increase contradicts the reservation.
- B- Excessive pessimism by adopting the minimum values of assets and the highest values of liabilities in accordance with the principle of reservation, as well as the non-recognition of unrealized profits by selling yet. Although it can be easily achieved if the administration so wishes, as market conditions allow for this profit. This pessimistic attitude contradicts the principle of the accounting periodicity and the need to identify each session accurately and realistic and depicting a

realistic financial position list. The principle of reservation leads to harm the interests of shareholders and reduce their profits in a certain accounting cycle for the benefit of others in future sessions.

1.4. Accounting Information Systems

Due to the rapid technological developments taking place in all fields, and the large size of the organizations and the expansion of their activities and the consequent production of a huge amount of different data, the need to use the computer in order to operate the data and the production of information for the purpose of taking advantage of the enormous and multiple capabilities which distinguish those computers.

The importance of accounting information systems comes from its great focus on how to compile the data and turn it into useful accounting information and ensure its continuity and reliability. Accounting information is the cornerstone of any organization. It is a link between the organization and its branches. It also serves as a communication link between the organization's work processes and the beneficiary and the guide person of this beneficiary when he takes his decision, as the quality of any decision depends on accounting information presented about it. It is the steering wheel which lead the organization and its decision-makers. On the other hand, the accounting information is a link between the organization and the external beneficiaries by presenting reports, prepared and resulted from the processing of financial events in the organization and measurement processes which, therefore, the flow and availability of accounting information as outputs for the system of accounting information is not a secondary need, but an urgent necessity for the organization's work and it is linked to its success and continuity.

There are several definitions of accounting information systems, defined by Mr. Kamal al-Din Mustafa al-Dahrawi: "a set of sub-activities used in the collection, compilation, processing, analysis and delivery of financial information for decision-making to internal parties (management) and external parties" (Al-Dahrawi, Accounting Information Systems, 1997, p. 39). Or, it is: "one of the components of the management information system, which is concerned with the collection, classification, appropriation and processing of financial operations and turn them into information and delivery of them to various concerned parties in order to rationalize its

decisions and this system consists of persons, procedures and information technology" (Al-Eissa, 2003, p. 20), and that Accounting Information System: " is a special system for collecting, classifying, processing, storing and communicating valuable information related to past, present and future economic events to the beneficiaries of this information to help them in decision-making (Qasim A. R., 1998, p. 67).

Moskov and Simkin argue that accounting information systems are: "A component of the administrative organization that collects, classifies, processes, analyzes, and communicates the financial information which are appropriate to take administrative decisions and communicates them to external parties (government agencies, creditors, investors) and internal parties (the management of the company) (Simkin, 2002, p. 25). The users of the outputs of the accounting information system include current and potential investors, employees, lenders, suppliers, trade creditors, customers, governments and the public. These financial statements are used to meet their various information needs. These requirements include the following (Al-Rifai, 2009, pp. 8-9):

- A- The accounting information system should achieve a high degree of accuracy and speed in the processing of financial statements when converted into accounting information.
- B- To provide the Department with the timely and necessary information to make a decision to choose one of the alternatives available to the Department.
- C- To provide management with the information necessary to achieve monitoring and evaluation of the activities of the Organization.
- D- To provide the Department with the necessary information to assist it in its important function of short-term and long-term planning for the future work of the Organization.
- E- To be fast and accurate in retrieving the quantitative and descriptive information stored in its databases, when needed.
- F- To be flexible enough when it is necessary to update and develop it to suit the changes in the organization.

From the above definitions, a comprehensive definition of accounting information systems can be given as: inputs by which the system processes its

components by interacting to form outputs that are ultimately used by internal and external parties. These outputs are what we call information.

It is indisputable that the ultimate goal of any accounting information system is to provide the right information for timely and appropriate decision-making, in the right form, in the right content, at the right cost, for the right person, and even to take right decisions. It is necessary to have inputs of information, as long as decisions affect the real world, inputs from information come from sending, translating or communicating the conditions and realities of the real world appropriately to decision-makers, and whatever the nature of the real world, we will not realize it until we can get information about its circumstances, conditions and events. Accounting information is considered one of the cornerstones of the integrated system for making decisions based on either the organizational level or any economic unit level derived from it. One of the most important reasons for the existence of accounting and its continuous development is that it provides information that is considered a basis for decision-making, whereby the accountant provides the appropriate information both to meet the management's necessities on various levels and to meet the necessities of the external parties to rationalize decision-making process.

Accounting information systems have 4 components.

- A- **Inputs:** They represent all inputs from human resources, and they serve as raw materials for the interaction process within the system.
- B- **Processing:** it is called the technical side of the system and presents the conversion that occur on the input system, in order to reach the outputs and achieve the objectives of the system.
- C- **Outputs:** the output of data processing, and there are several forms for the outputs in the accounting information systems, including documents, reports and financial statements.
- D- **Feedback:** It is the process of returning some of the results of the system, which represents the outputs back to the system in the form of inputs (Marshall, 2015, p. 17).

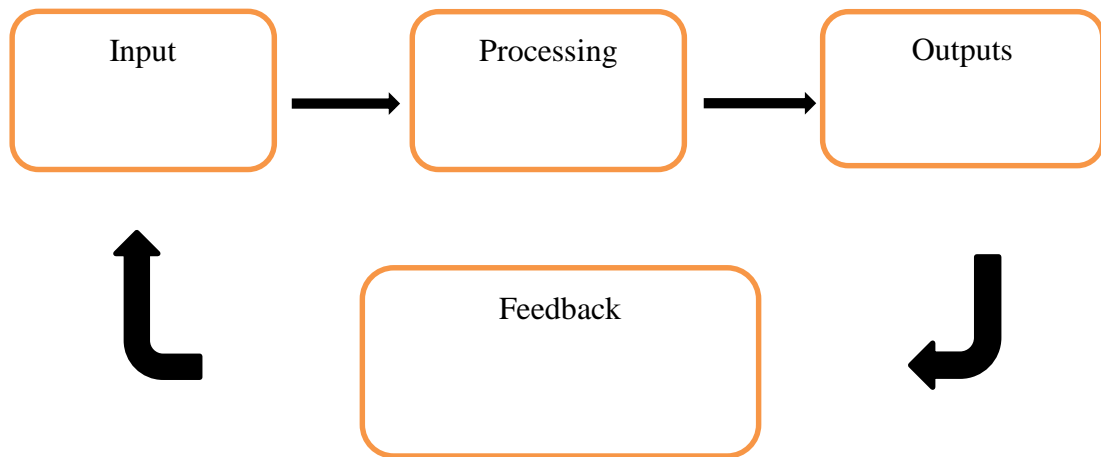


Figure 2: The Components of Accounting Information System

Source: Marshall (2015), Accounting Information Systems, New Jersey USA, by Pearson Education, p17.

The accounting information system, like any system, consists of a set of elements to achieve its objective for which the system was created. These elements are (Hafnawi, 2001, pp. 58-59):

- A-** Documents supporting the financial transactions occurring in the economic establishment.
- B-** Databases where the financial statements of financial operations are stored.
- C-** Computer applications that process data to convert them into useful and relevant information.
- D-** The drawn and written accounting procedures for the sequence of financial operations in the establishment.
- D-** Individuals dealing with one or more elements of the accounting system.
- E-** Electronic and technological means used in the accounting information system, and factors affecting the system, which are the individuals who are based on this system and the processes of data collection, processing, storage and decision-making, in addition to the devices and means used to achieve the goal of the system in obtaining accounting information that support decision-making.

Characteristics of accounting information system could be listed as follows:

- 1- The accounting information system consists of a set of physical and human parts that combine to form the overall framework of the system.
- 2- Accounting information systems include a set of procedures, rules and principles that are linked between the parts of the system and its components and its dynamic movement.
- 3- Accounting Information System seeks to achieve a set of main and sub-objectives of producing and communicating accounting information to its users.
- 4- The accounting information system consists of a set of partial systems that are linked with each other in a hierarchical relationship, that is, each partial system is linked to another partial system at a higher level so that these systems form the structure of the entire accounting information system (Saad, 2000, p. 115).

For accounting information systems to achieve their objectives, there are a number of factors that affect the efficiency and effectiveness of systems. These factors are:

- A- Internal factors: They are all the physical, programmatic and human resources available in the system, in addition to the available data and procedures used in the operation of the system (Waqtani, 2007, p. 5)
- B- External factors: are factors outside the scope of economic unit, and they are represented in the needs of operational activities of resources and information related to the market, competition, and technological developments. In addition, information systems work to provide the needs of government agencies, investors and other external parties for the information they need related to operational activities (Khattab, 2002, p. 6)

Accounting information systems must perform functions that contribute to the production of information when they perform best. These functions are (Marshall, 2015):

- A- **Data collection:** where the data arise in all the occurrences of economic events carried out by workers in different places, so that the data is transferred and reach the system to begin processing operations.

- B- **Data Processing:** When the documents arrive, the processing process begins. They are sorted, classified and matched, recorded and then posted to the relevant accounts.
- C- Protection of data and information: When preparing the information that gives the perception of facts on the accounting information system, and the protection of data and information generated during the exercise of the activity, protection should ensure the preparation of sound and error-free documents, whether spontaneous or intentional errors, as well as it ensures the safety of inputs and their processing of mistakes .The functions of accounting information systems can be categorized (Aldalahmh, 2008, p. 22):

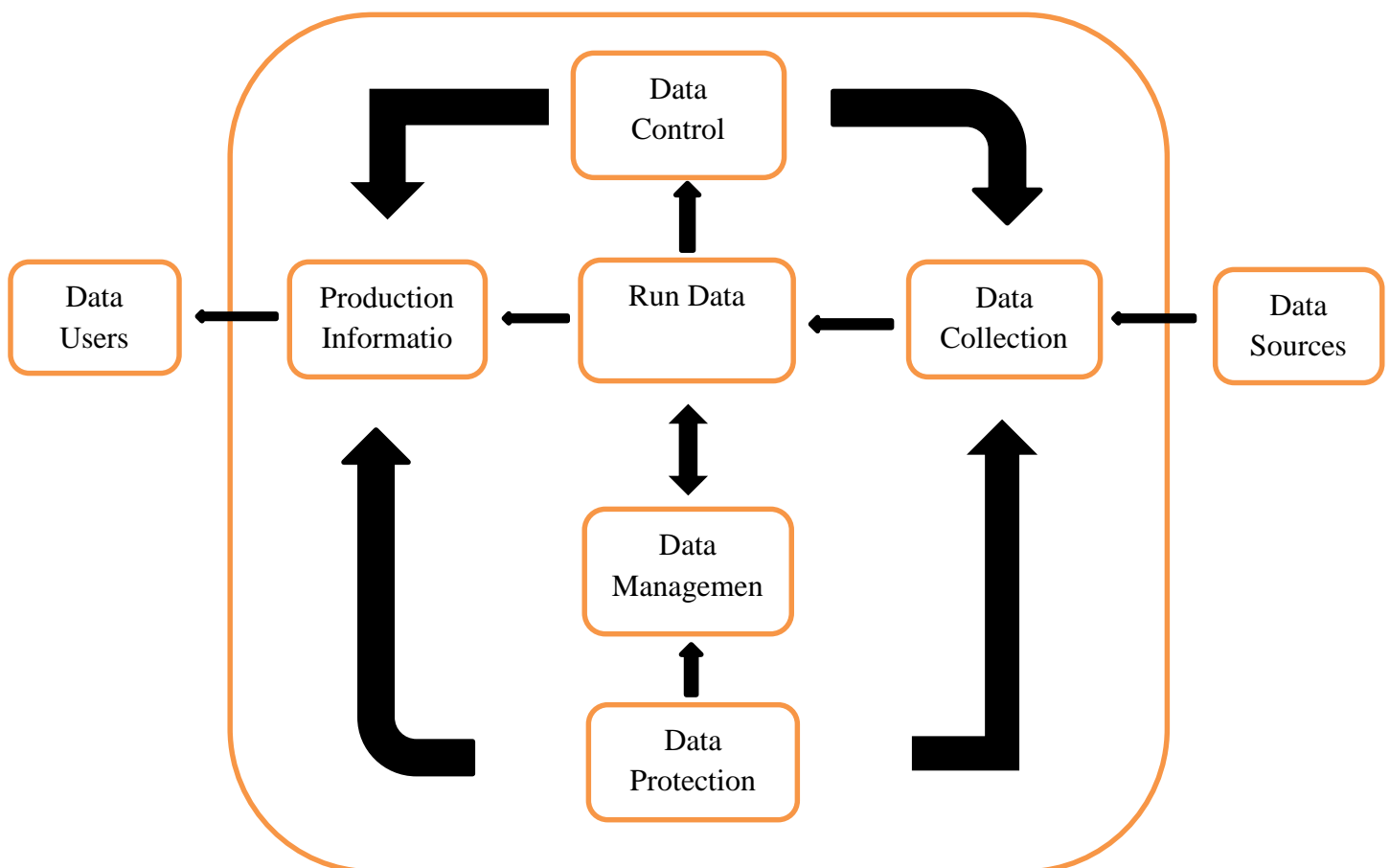


Figure 3: Accounting Information Systems Categorized

Source: Aldalhama (2008), Fundamentals of Accounting Information Systems and Information Technology, Amman Jorden, Al Warraq for Publishing & Distribution, p22.

The researcher believes that the functions of accounting information systems are effectively linked with each other and complement the work of each other in order

to provide timely appropriate information to decision makers. The accounting information system is one of the most important subsystems of the information systems, because of its specificity in the field of decision-making, as it is comprehensive to extend to all activities of the institution or economic unit, and provides information related to all its activities for different administrative levels, often each decision-making site needs accounting information, whether at the lower levels to know the daily work progress, or at the level of middle management to know the level of quality and efficiency of work, or at the level of senior management to prepare various budgets. Accounting information systems specialize in the collection of accounting information resulting from the operations carried out by the institution and processed to provide in the form of a product represented in the accounting information for both internal and external parties to be used in different fields and functions, such as planning, control and decision-making process, where we find that the accounting information systems in any institution or economic unit represents the link between each of the decision and implementation centers and the nervous system which forms the main engine of all activities in the institution, all based on the tight design of accounting information systems and the way of its application.

1.5. Financial Statements

Although the financial statements may seem similar between countries, there are differences between them that may be caused by different social, economic and legal circumstances, and because of what different countries perceive of the needs of different users of the financial statements when they are subject to national requirements.

The financial statements are usually prepared in the light of an accounting model based on historical recoverable cost and on the concept of nominal capital preservation. Other models and concepts may be more appropriate to achieve the objective of providing useful information for economic decision-making, but at present there is no general agreement on change. This framework has been designed to be appropriate for a range of accounting models and concepts of the capital and its maintenance (Hammad, 2004, p. 68). Financial statements are the means of accounting for the delivery of information prepared and compiled in financial accounts on a regular basis (Dusoki, 2002, p. 97), or they are a set of financial statements pertaining

to the economic unit and arranged in tables prepared according to certain specifications, in accordance with a set of accounting concepts and principles and on a logical and coordinated basis (Matar M. , 2004, p. 309).

Accounting is an information system that collects and communicates economic information about a particular enterprise to a large number of users and different persons whose decisions are related to the activity of this establishment, including investors, suppliers, managers, government departments and others (Wajnat Jerry, 1999, p. 22). The financial statements are the main outputs of this system and the main connector of information. The concepts and contents of the financial statements, prepared by the establishments, vary according to the regulators of the accounting profession, and the difference in their perception of the end-user of the information contained in these statements, and the financial reports must disclose all that would make them not misleading (Yamani Abdullah, 1990, p. 61).

IASC defined the financial statements as: A systematic financial restatement of the financial position and operations of the institution during a specified period of time, often one year (Hammad, 2004, p. 111).

The main outputs of accounting information systems are a set of financial statements: Income statement, Statement of financial position (balance sheet), Statement of change in equity, and Cash Flow Statement.

1.5.1. Income Statement

This is a list of gains as sometimes called, which reflects the success of the operations of the business in a certain period of time, and this list is used to determine the profitability of the enterprise and the strength of confidence in the income statement is considered a matter of suspicion, because the income derived from them is at best estimated and approximate. The measurement of income in accounting is a reflection of many assumptions and principles (standards) developed by accountants over the past decades, such as the principle of periodicity and the principle of recognition of revenue and the principle of interview (Wajnat Jerry, 1999, p. 167). Accordingly, the income statement is: a tool to achieve the principle of matching

revenue with expenses to determine net income or loss simply and clearly (Jaffar, 2003, p. 259).

Defined by IASC as: A key component of an entity's periodic financial reports, it reflects the majority of changes in an entity's financial position over the reporting period, which is often a full year, so management uses the income statement as a measure of its effectiveness and efficiency in blending factors of production into goods and services that they create and sell. The information provided by the income statement, which relates to individual items of income and expenditure, facilitates the financial analysis process, especially those indicators related to the profitability of the entity. In addition, the income statement provides relevant information for sound economic decisions (Hammad, 2004, p. 157).

The objective of the income statement is to show the net result of the activity at the end of the financial period, whether it is a net profit or a net loss. It aims to know and measure the success of a project over a given period (usually a year, half a year, or every three months) in exploiting the resources available for profit (Hilal Abdullah, 1999, p. 49). Therefore, we can say that the income statement aims at (Salem Helles, 2001, p. 105):

- 1- Evaluate the feasibility and returns of investments
- 2- .Evaluate project management efficiency.
- 3- Evaluate the ability of the project to borrow from banks and investors.

The income statement is the most important among other financial statements. It is the report that measures the success of the company's operations for a specified period of time. Therefore, the importance of this list comes from (Al-Faddagh, 2002, p. 101):

- 1- Helps accurately predict the future income of the business.
- 2- Assists in better evaluation of the possibility of receiving the project cash.
- 3- Assists in ensuring that the economic resources have been best utilized.

Despite the many forms of income statement, they often contain all or some of the following elements (Jaffar, 2003, p. 260):

- 1- Net sales.
- 2- Cost of sales.

- 3- Gross profit.
- 4- Business administration expenses.
- 5- Net income from ordinary activity.
- 6- Other expenses, other revenues.
- 7- Net annual income before taxes.
- 8- Tax provision.
- 9- Non-recurring elements, whether revenues or expenses.

1.5.2. Statement of Financial Position (Balance Sheet)

This is a list that provides information about the nature and amount of investments in the assets of the entity and the obligations of the entity to its creditors, and the right of owners to the net assets of the enterprise, where the financial position of the entity is represented in its assets and liabilities or obligations towards others, at the last moment of the ending financial period (Jaffar, 2003, p. 266). This list is provided after preparing the final accounts and knowing the net result of the activity from profit or loss. It includes all the accounts that are still open in the final accounts that have not yet closed. The budget has two sides, the first is called the right side and it includes all special items of entity's assets and its rights committed on others, the second is called the left side and fall in which all special items of established liabilities and its obligations to others.

The statement of financial position aims at showing and depicting the economic or financial position of the economic unit at a particular moment (Salem Helles, 2001, p. 99).

The importance of the statement of financial position stems from its contribution to the financial reporting process by providing a financial basis for the following (Wajnat Jerry, 1999, p. 224):

- 1- Calculate the rates of return.
- 2- Evaluate the capital structure of the enterprise.
- 3- Estimating the degree of liquidity and financial flexibility in the establishment.

The budget is the main source of information about the liquidity and financial flexibility of the enterprise, which in turn enables users of financial statements to judge the degree of risk to the enterprise and estimate the cash flows in the future. The budget must be analyzed the budget and the liquidity of the enterprise and its financial flexibility must be determined.

Most of the budgets of commercial and industrial establishments are classified as follows:

First: The asset side

This aspect represents the items in which the funds of the entity continued to buy, sell or invest. It consists of the following:

- 1- Fixed assets.
- 2- Current assets.
- 3- Other miscellaneous assets.

Second: The side of the adversaries is divided into two parts:

- 1- **The first part:** represents the internal obligations of the establishment and is represented by the capital, which is the rights of the owners of the facility on its own as an independent moral entity, which is (paid-up capital plus the mechanism of realized profits and additions to the original capital, or minus losses and withdrawals from the original capital).
- 2- The second part: is the external obligations of the establishment to third parties outside the establishment. They usually consist of the following (Jaffar, 2003, pp. 268-269):
 - A- Long-term liabilities.
 - B- Short-term liabilities.
 - C- Other payables.

1.5.3. The Statement of Change in Equity

A link between the income statement and the statement of financial position with multiple sources of equity. A single list should be allocated to explain the causes

and sources of this change. The objective of the change in equity statement is to provide useful information on the sources of change in the financial position elements.

The importance of the statement of change in equity by linking it to the statement of income and the statement of financial position. It reveals the amount of change resulting from the statement of income represented in the form of profits or losses in the financial cycle of the entity and the resulting change in retained earnings, as well as monitoring the currents that affect the items of ownership from the first financial cycle to equity at the end of the financial cycle, therefore, the list of changes in equity belongs to the type of statement of flows (Hanan R. , 2003, p. 292).

The statement of change in equity consists of the following:

- 1- Changes in paid-up capital.
- 2- Changes in retained earnings.
- 3- Changes in the calculated capital.

1- Changes in paid-up capital:

The paid-up capital consists of legal capital which represents the nominal value of shares or the value of shares and additional capital, which represents the premium or deduction of the issue of shares, capital grants and treasury shares (treasury shares are considered negative elements that lead to a reduction in capital because they are purchased).

2- Changes in retained earnings:

The changes in this section of equity are attributable to three main elements:

- a- The balance of retained earnings and its adjustment in previous years.
- b- Dividends to owners or shareholders during the session.
- c- Net comprehensive income or loss as shown in the statement of income for the current financial period.

Note that dividends are made either in cash or in kind and in all cases these dividends affect the total equity.

3- Changes in calculated capital:

The main sources of change in computed capital are:

- a- Gains or losses on revaluation.
- b- Unrealized acquisition gains or losses.
- c- Gains or losses on translation of available foreign currency balances at the end of the cycle.

1.5.4. Statement of Cash Flows

In view of the deficiencies in the financial statements mentioned above in the detailed summary presentation of both internal and external flows, or sources and uses of cash during the financial period, the Financial Accounting Standards Authority (FASB) has requested in Standard 95 of 1987 (Hanan R. , 2003, p. 247) a new financial statement, the Statement of Cash Flows, whose primary purpose is to provide appropriate information on the entity's cash receipts and payments during the financial period to assist investors, creditors and others in their analysis of cash flows (Wajnat Jerry, 1999, p. 247). This list determines:

- A- The monetary effects of the entity's operations during the period.
- B- Its investment characteristics.
- C- Its financial characteristics.
- D- Net increase or decrease in cash during the period.

The report of the working group to study the objectives of the financial reports issued in 1973 (known as the report of the TRUEBLOOD COMMITTEE) of the AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS (AICPA) confirmed that: One of the objectives of the financial statements is to provide useful information to investors and creditors to predict and assess cash flows in terms of amount, timing and uncertainty ratio. In its first statement (Statement 1 of 1978), FASB also emphasized that the three main objectives of the financial report were to estimate the amount and timing of the degree of uncertainty of cash flows, so the statement of cash flows aims to:

- 1- Evaluating the ability of the entity to generate cash in the future.
- 2- Assessing the ability of the entity to repay debts and providing the necessary liquidity.

- 3- Evaluating changes in the financial structure of the entity.
- 4- Evaluating the monetary and non-monetary aspects of investment and finance operations and the ability of the entity to control the timing of flows and their suitability to circumstances and variables.
- 5- Enhancing the ability to make comparisons with the performance of similar enterprises as the list excludes the impact of the use of different accounting treatments for the same transactions.
- 6- It is used as a basis for assessing the accuracy of financial planning for the performance of the entity in terms of comparing the estimations with the actual reality, and the evaluation of the relationship between profitability and net cash flows, and the impact of price changes.

Obviously, the achievement of the above objectives requires the introduction of the concept of internal and external cash. The preparation of the list should be based on the concept of cash and cash equivalents, i.e., cash and any other assets that are rapidly convertible into present cash, such as receivables, debtors and any short-term investments that can be easily converted into cash. The accounting unit is required to disclose its policies in determining the elements that are considered to be cash equivalents. In order to increase the effectiveness of the list in achieving the stated objectives, cash flows are categorized into three groups (Hanan R. , 2003, p. 300):

1- Operating Activities, and they include:

- A- All major income-generating activities (transactions in determining net profit / loss).
- B- All cash receipts resulting from the sale and the provision of services, commissions and revenues and all cash payments to meet the obligations of employees.
- C- All payments and cash receipts related to contracts of dealing or trading with others.
- D- All payments and cash receipts related to income taxes as well as transactions with insurance companies.

2- Long-Term Operating Activities, and they include:

- A- Activities relating to the acquisition and disposal of long-term assets.
- B- Cash receipts from the sale of fixed and intangible assets.

- C- Cash receipts resulting from the sale of shares and bonds (not originally allocated for trading).
- D- Cash receipts from loan collection (not applicable to financial institutions and banks).
- E- Cash payments for the acquisition of fixed and intangible assets.
- F- Cash payments for the purchase of shares and bonds (not for the purpose of trading).
- G- Cash payments and loans to others.

3- Financing Activities, and they include:

- A- All activities that result in changes in the size and components of equity and borrowings.
- B- Cash receipts for issuing shares.
- C- Cash receipts for issuing bonds, loans or notes payable.
- D- Cash payments to repay borrowed amounts if to reduce the obligation.

1.6. Users of Financial Statements

The final output of accounting through accounting information systems is a set of financial reports prepared by the management of the enterprise for the benefit of multiple parties inside and outside the entity, and therefore, accounting starts from defining the main functions of these reports, and may effect and affected several parties in the preparation of these reports. A large part of the problems raised by the process of determining the objectives of the financial reports arises from the possibility of conflicting views among users of financial statements, and this may impose the dominance of the views of one group over the views of others. At present, the view of users of financial statements has become the dominant point in determining accounting objectives. This trend has been defined as the utilitarian trend, or the usefulness of information in decision-making. Since the main function of financial reporting and the nature of the information depend on the information needed by the users of these reports, the needs of the users of the reports must be determined, and the dominance of their point of view in the process of production and distribution of accounting information. It is the responsibility of the enterprise to direct and develop their potentialities and capabilities towards achieving these needs, where any conflict

between what is required of information and what is achievable is eliminated (Salem Helles, 2001, p. 36). The users of financial statements can be divided into two main categories:

Users with Direct Interest in the Project, who are: Shareholders (current and potential), Creditors (short-term and long-term), Managers, Employees, Suppliers, Competitors, and tax authorities.

Users with Indirect Contact with the Project, who are: Analysts of financial statements, Trade unions, Government agencies and bodies, Professional bodies and exporters of accounting standards, and audit offices.

Based on the foregoing needs of accounting information and its users, the financial statements are general purpose lists, so that the needs of many users can be met through them with a focus on the needs of direct users who have the power to obtain accounting information which are investors and creditors (Hilal Abdullah, 1999, p. 5).

2. CHAPTER TWO: ANALYSIS OF ACCOUNTING DATA

Financial analysis aims at assessing the accounting policies of an entity and assessing the nature and degree of its flexibility. It is limited to the published accounting data for one financial period or several financial periods. Financial analysts performing accounting analysis face two main problems in this analysis:

- 1- Different accounting standards and accounting disclosure within the State
- 2- Difficulty in obtaining the necessary information to do the accounting analysis.

The analyst here is concerned with the collection, classification, and measurement of information, especially information relating to financial statements published by the enterprise. The published information is usually in an overall and absolute form, but it becomes more valuable if classified and arranged in a way that reflects the relative importance of its various items and policy trends.

Accounting data and information are essential components of accounting information systems and are often used in working life as synonyms in order to denote one meaning despite the fundamental differences between them, and it should be noted that it is necessary to distinguish between the two concepts, as an introduction to the study of accounting data where (Qasim A. R., 1998, p. 15) sees the data are: "numbers, alphabets and symbols that adequately represent facts and concepts that can be communicated, translated and processed by human beings into results" (Dahrawi, 1997, p. 1). He sees the accounting data as: "a set of values, symbols and words that are assembled from inside and outside the project as a result of the events of economic processes practiced by the accounting unit and represent the raw materials (inputs) that are operated and managed by the accounting system in order to extract information". The accounting statements are preliminary, unsorted, and irregularly significant facts and indications that have a significant historical value and have no impact on management decisions and are therefore of simple economic value. Data are in the form of values, facts and estimates that are independent of each other and are often not intended for direct use (Qasim A.-R. M., 1993, p. 8).

Accounting information consists of data that is retrieved and processed for the purpose of expressing an opinion or as a basis for forecasting or making decisions. The accounting information is digital such as financial statements. Accordingly, accounting information is the data that has been processed to obtain meaningful indicators that are used as a basis in the decision-making and forecasting process.

From the above, it can be concluded that accounting data is raw materials and represent inputs into accounting information systems and is not suitable for decision-making and characterized by being unorganized, while information represents the final product of the accounting system, which goes to the surrounding environment in data processed and operated to reflect events and real economic realities, which confirms that it helps increase the ability of its users to make appropriate decisions.

The following table shows the differences between accounting data and information (Al-Qatnani, 2004, p. 31):

Table 1: The Differences Between Accounting Data and Information

NO	Difference Aspect	Data	Information
1	Its Nature	Raw materials represent primary values and facts	Final values and facts
2	Its location in the accounting system	Represent inputs in the system	Represent output in the system
3	Its origin	Lower levels inside and outside the system	Upper levels within the system
4	Its significance	Historical significance	Predictive futuristic
5	Its economic value	High economic significance	Simple economic significance
6	Its impact on decisions	It has no direct impact on the rationalization of administrative decisions	It has a direct impact on the rationalization of administrative decisions
7	The relationship between its items	Their items are independent of each other and there is no connection between them	Their items are interrelated and tangled

Source: Al-Qatnani, K. (2004). The Effect of Using Accounting Information on the Administrative Performance of Jordanian Public Shareholding Companies. Amman, Jordan: University of Jordan, p.31.

The researcher believes that information is the results of the final data after arranged, analyzed, processed and interpreted, and there are fundamental differences between the data and information where data is the raw material that is processed in order to obtain information.

2.1. Accounting Data Analysis Techniques

Until the beginning of the twentieth century, the financial statements were merely proof or evidence of the work of the account's holder, although they contained important information that could be used to evaluate the performance of the project.

However, in February 1895, the Association of Bankers in New York State recommended that borrowers should be required to provide the financial statements of their projects which are an integral part of the data supporting the loan application. The recommendation addressed to the members of this association was that “those who borrow money should ask their institutions to provide them with written statements about their assets and liabilities, as recommended by the Consolidated Data Committee for different groups (Al-Azmeh, 1986, p. 648).

Simplified financial analysis is a set of mathematical, statistical and technical styles and methods used by the financial analyst on financial accounting data and reports in order to assess the performance of institutions and organizations in the past and present and predict what they will be in the future (Al-Hyali, 2004, p. 21). Others (Society, 2005, p. 3) believe that the financial analysis is: an input or data-processing system to extract information that helps decision makers identify:

- 1- The previous performance of the enterprise and the reality of the financial and economic situation of the enterprise now.
- 2- Forecasting the financial performance of the enterprise in the future.
- 3- Evaluation of management performance.

According to the above definitions, financial analysis is the process of extracting information from available data in order to identify the past performance of the enterprise and to predict its future performance and evaluate its current performance in order to help management in making decisions.

Others (Aqel, 2006, p. 232) believe that financial analysis is: “A systematic process of processing the financial accounting data available for an establishment to obtain information for decision-making and evaluation of past and present performance of business and industrial establishments, as well as in the diagnosis of any existing financial or operational problem and anticipate what the situation will be in the future”. This view is based on the fact that financial analysis is a data processing and is an acknowledgment that financial analysis is in fact an information system and if they did not declare it, but the meaning leads to that.

The researcher believes that financial analysis is a process of evaluation and control as well as an information system as it derives its inputs from data, figures, reports and statements from different establishments and the external environment, whether the sector in which this enterprise operates or that larger environment (city,

country, regional and international environment). It then conducts operations on these data and figures in special ways and known to the specialists, then the outputs of this system are reports, ratios, plans and advice provided by the various administrative levels, whether in the enterprise and organizations or at the level of macroeconomics. The feedback system (financial analysis system) is to verify the validity of these outputs presented in the form of ratios or mathematical or statistical methods and their conformity with reality.

There is no doubt that the importance of accounting data analysis stems from the importance of these accounting, administrative and economic studies in recent years, as the expansion of organizations and the divergence of centers and branches of enterprises geographically as well as the expansion and complexity of economic operations in the world, and the emergence of new tricks and tools of fraud, deception, and embezzlement led to the need for an effective control tool which is the financial analysis of accounting data. In general, the importance of financial analysis is as follows (Al-Hyali, 2004, p. 24):

- ❖ A tool of effective control and is like an early warning device and guardian of the enterprise if it is used effectively.
- ❖ It is used in evaluating the economic feasibility of establishing projects and evaluating performance.
- ❖ It is a tool of planning as it helps in predicting the future of future units.
- ❖ It is a tool of decisive decision-making, especially regarding decisions of integration and expansion.

To achieve these goals, each entity must use appropriate analytical tools to obtain information that can be useful for decision-making. These analytical tools (Khaled Amin, 1998, p. 10):

Appropriate Financial Analysis: This type of analysis is carried out by examining the relationship between the components of the financial statements in order to produce information showing the prevailing financial situation in the enterprise.

List of sources of funds and their uses: This type of analysis focuses on identifying methods of obtaining funds and methods of using them during a specific time period. This type of analysis is useful in identifying internal and external sources and the importance of each of them to work on the suitability of this source with the uses.

Estimated cash budgets or cash flow statements :This analytical tool helps you to know when the money will flow to and from the enterprise and how much money the enterprise needs in the coming period.

Estimated budgets :This analytical tool is based on identifying the expected volume of assets, liabilities and rights, financial needs, and knowing the expected profits.

Equalization Analysis: This analytical tool aims to identify the level of sales and the number of units sold until the profit before interest and tax.

Comparison of financial statements for different years :This analytical tool shows the changes that occur in the items of the financial statements from year to year during a specific period from year to year.

Comparison of trends based on a record :This analytical tool helps identify over two years to overcome the drawbacks of comparison from year to year.

Financial analysis is carried out according to three main steps (Youssef, 2012, p. 28):

Classification Stage: The financial analyst at this primary stage classifies the numbers contained in the financial statements for more than one accounting period and then breaks them up into two parts, namely, assets and liabilities. Specific and homogeneous groups are then placed so they can be processed.

Comparative phase: This stage is to discover the relationships between the various elements of the financial assets of the institution and financial obligations and financial position and to know the reasons for the establishment of this relationship.

Conclusion: After classification and comparison. the analyst looks for reasons. judging the financial position of the institution and evaluating the proposals.

If we consider that the ultimate goal of the financial analyst is to provide realistic indicators that give a picture of the aspects of the project activity that are closest to the truth, we must provide the elements of its success in achieving this goal by making sure to provide a set of conditions, including those related to the analyst,

and those related to the method and analysis techniques. It is also related to the sources of information he relies on (Matar M. , Recent Trends in Financial and Credit Analysis, 2006, p. 4).

These components can be limited to the following (Ashish, 2010, p. 26):

- ❖ The sources of information, from which the financial analyst investigates his information, should have a reasonable degree of credibility or reliability.
- ❖ That the financial analyst in the process of financial analysis undertakes a practical approach which is commensurate with the objectives of the analysis process, and that he uses methods and techniques that are also combined in a balanced manner between the merits of objectivity and appropriate to the objectives sought.
- ❖ The financial analyst should be objective by focusing on understanding his limited role in uncovering the facts as they are before they are interpreted in an abstract way away from personal bias, and then to present his report with the indicators and alternatives which serve the decision-maker, taking into account the recommendation of the best alternative.

In addition to some other ingredients, namely:

- 1- Clear definition of the objectives of financial analysis.
- 2- Determining the financial period covered by the analysis and providing reliable financial data.
- 3- Identifying the appropriate indicators to reach the best results and as soon as possible.

The beneficiaries of the accounting financial analysis of the financial statements can be identified as follows (Abbas, 2008, p. 100):

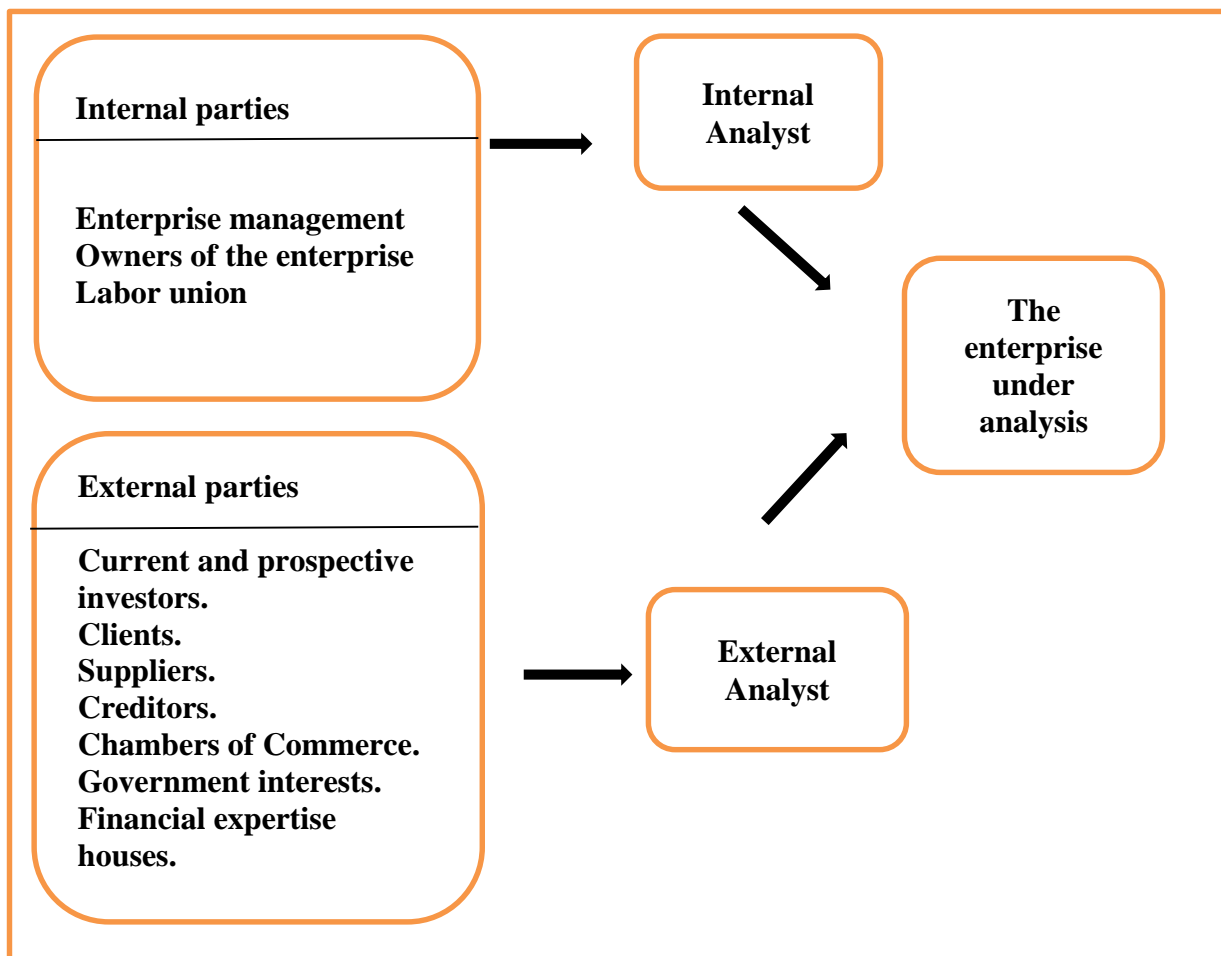


Figure 4: The Beneficiaries of Accounting Financial Analysis of Financial Statements

Source: Abbas, A. (2008). Financial Management. Amman, Jordan: Ethraa Publishing & Distribution, p.100.

2.2. Financial Analysis Methods

Financial analysis tools can be useful in assessing a company’s performance and trends in that performance. In essence, an analyst converts data into financial metrics that assist in decision making. A primary source of data is a company’s annual report, including the financial statements and notes, and management commentary. There are four main methods of financial analysis.

2.2.1. Horizontal Analysis

It is also called historical analysis. This analysis is done by calculating the change in the main elements of the financial statements from one year to another in the form of percentages in order to clarify the variables that occur. Thus, it is a dynamic

analysis because it shows the changes that occurred in a relatively long period of time (Al-Kalhout, 2005, p. 31). where the percentage of change is calculated as follows (Aqel, 2006, p. 305):

- ❖ The value of the change in any element = the value of the element in the comparison year (e.g. 2010) - the value of the element in the base year (e.g. 2005).
- ❖ Percentage of change = value of element at point (A) / base year amount (2005).

The percentage change in one year can be extracted as follows:

$$\frac{\text{value of the element in the comparative year} - \text{value of the element in the base year}}{\text{value of the element in the base year}} * 100$$

The analyst for investment purposes is not only interested in knowing the level of profits, but also concerned with the extent of stability (Earnings Stability) and its direction (Earnings Trend), and these qualitative qualities of profits can be derived from the examination of time series, while vertical analysis does not reveal such qualities. For example, the profit figure in a given year, regardless of its size, does not give a meaningful indication of the extent of improvement or decline in profitability, and in general to judge the extent of fluctuation in profits and its direction requires the analyst at least three or five years.

Example:

The following table shows the annual profits of three companies over three years

<i>Years</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>Average Profit</i>
<i>Company A</i>	4000	5000	6000	5000
<i>Company B</i>	300	7000	5000	5000
<i>Company C</i>	7000	5000	3000	5000

The table indicates that the average profits of these three companies are equal and this means that they have the same level of profits, but after examining the time series of corporate profits, the investor may prefer one company over another because of the qualitative characteristics of these profits, for example, companies (b) and (c)

have the same level of profits and the same degree of stability, but the investor may prefer company (B) because the trend of profits in it is increased while in company (C) is decreasing. Of the three companies, A is the best as its profit trend is increasing and its stability is higher than other companies.

In horizontal analysis, the behavior of a certain accounting number is tracked, such as profit from one financial period to another. In general, if the current year's profit exceeds the profit of the previous year, it can be said that there is an improvement in the level of profits, but before reaching this conclusion, the analyst should consider the analysis tools used to minimize the chances of making false conclusions. The most important determinants of horizontal analysis are (Al-Khalya, 1998, p. 41):

The first determinant, the use of absolute numbers of accounting variables may lead to misleading results that are incompatible with the economic dimension of change in this variable .Example:

<i>Year</i>	<i>Profits for the year 2010</i>	<i>Profits for the year 2011</i>	<i>Change in Profit</i>	<i>Percentage change in profit</i>
<i>Company A</i>	100	120	20	20 %
<i>Company B</i>	400	424	24	6 %

A preliminary view of the two companies' profits indicates an increase in Company B's profits by \$ 24, which is higher than the increase in Company A's profits of only \$ 20. Based on these figures alone, the user of the financial statements may conclude that the improvement in profitability of Company B is better than in Company A. This is the erroneous conclusion of ignoring the profits of each company, which is often related to the size of the company.

The problem of volume can be overcome by using the percentage change or relative change in profits instead of absolute change. If we consider the percentage change in profits, this percentage in Company A of 20% is much higher than the percentage change in profits of Company B of 6 % only.

The second limitation, Using the percentage change in horizontal analysis may result in extreme values if the base year is too low or too high as in the following example:

	<i>Average Profit</i>	<i>Profit</i>	<i>Profit for the year</i>	<i>Amount of change</i>	<i>Percentage change in profit</i>
	Years from 2000-2005	2000	2001		
<i>Company A</i>	300	100	290	190	190 %
<i>Company B</i>	1100	100	1250	250	25 %

$$\text{Relative change} = \frac{\text{current year profit} - \text{previous year profit}}{\text{previous year profit}}$$

Relative change in the profits of the company A in 2001 = $(290-100) / 100=190\%$

Relative change in the profits of the year 2001 for the company (B)= $(1250 - 1000)/1000=25\%$

Note that the percentage change for company (A) for the year 2001 is an extreme value and does not commensurate with the economic dimension of change, especially that the typical profits of this company between the years 2000 - 2005 is 300 dollars, but because the profits of 2000 are so low, there has been an extreme rate of change disproportionate to the economic dimension of change.

In general, the decline in profits in a given year is largely due to the occurrence of extraordinary losses or the rise of profits significantly due to extraordinary or emergency profits are certainly caused by unusual events, such as a significant increase in sales due to a breakdown in a factory of major competitors. This makes the year inappropriate as a base year to calculate the percentage change because in both cases using this year as a base year to calculate the percentage change in profit or sales leads to an extreme value of the percentage change.

The third limiter, A negative value in the base year results in a misleading rate of change that is not commensurate with the reality of change (Bernstein, 1989, p. 78). An accounting variable, that may take a negative net income value, occurs when a company makes a loss in a year. It can be illustrated by the following example:

	<i>Profit for the year</i> 2000	<i>Profit for the year</i> 2001	<i>Percentage of</i> <i>change</i>
<i>Company A</i>	(100)	20	120 %
<i>Company B</i>	(10)	20	300 %

It is noteworthy that the rate of change takes negative values in both cases, although the change in profits for the year 2000 to 2001 is positive, and it is worth mentioning that the omission of the signal, i.e., the use of the absolute expression does not solve the problem. Even with the omission of the signal, the percentage change in profit for Company B is much higher than for Company A, although profits increased by \$ 120 for Company A and \$ 30 for Company B.

The researcher believes that the analysis tools available to the analyst are multiple, and there is no specific analytical tool can be described as the best tool for all purposes of users of accounting financial statements, so usually the analyst blends more than one analytical tool to reach appropriate conclusions. He may use horizontal and vertical analysis in addition to financial ratios to conclude about the strength of a company's financial position or to assess its profitability.

2.2.2. Vertical Analysis

It is also called perpendicular analysis, and it analyzes each of the financial statements individually. Therefore, the vertical analysis is done for one year, and this analysis is based on the conversion of absolute numbers of items in the financial statements to percentages (Al-Matarna, 2006, p. 93).

Vertical analysis is based on the study of single budget elements by showing the relative weight of each budget element to the total budget or to the group to which it belongs (Mohamed, 2005, p. 39). This allows us to identify the internal structure of the budget by focusing on two elements: the sources of funds in the institution and how to distribute them among different sources of short-term and long-term loans and private funds, and how to allocate sources between different uses of current and non-current assets (Karajeh, 2006, p. 162).

This analysis can be used to analyze the results of calculations, where all elements of the results of calculations are attributed to the turnover in the same list, or to the total assets (especially in the case of financial institutions), which allows us to assess costs and profits.

This analysis can also be used to analyze the statement of cash flows, where each item of the statement of cash flows is expressed as a percentage of total cash inflows and outflows or as a percentage of turnover.

Vertical analysis, as a financial analysis tool used by the analyst to reach its specific objectives, has the following characteristics:

- ❖ The analysis is performed on a single financial statement for a single financial period in order to arrive at a statement of the relative importance of each element within a single financial statement.
- ❖ This analysis is carried out by the ratio of the element to the group of elements to which the element belongs (the relative weight of this element in relation to the total financial statement), and is then compared with a specific standard for similar enterprises or the industry standard in which the enterprise operates, if available.
- ❖ This analysis is concerned with the ratio of the element to the total list to which the element belongs (the relative weight of this element relative to its group).
- ❖ This analysis is concerned with the ratio of the group to the total list on which the analysis is conducted (the relative weight of this group in relation to the total financial statement).
- ❖ Statement of the significance of the relative weights extracted on the reality of the enterprise.

Therefore, this analysis is a means of determining the relative importance of an element or group during the financial period under review and assessing the general trend of this relative importance.

Vertical analysis of the statement of financial position is based on two important aspects: first, the sources of funds for the enterprise and how to distribute it between long-term liabilities, equity and current liabilities, and secondly the uses of funds obtained from all sources, i.e., how to distribute assets between the current and fixed and others where this leads to identify the mix of assets that the enterprise chose to perform its operations through it.

In order to apply the vertical analysis to the statement of financial position, this list is converted to a list of relative distribution, then interpreting the significance of these relative weights and drawing conclusions from them.

The relative distribution of the statement of the financial position aims to indicate the relative weight of each element of the statement of financial position within the group to which it belongs or its relative weight in relation to the total components of the list, in addition, the proportional distribution lists are concerned with the relative weight of each group of major groups consisting of a single list to the total list (Al-Zou'bi, 2000, p. 221), where all the elements of the statement of financial position and their totals are converted to relative weights as follows: For example, if we take the item of buildings:

$$\text{Relative weight of buildings to their group} = \frac{\text{value of buildings}}{\text{total physical assets} * 100}$$

This ratio indicates the relative importance of the building component of the physical fixed assets to its total group, which is the physical and fixed assets of the statement of financial position.

$$\text{Relative weight of buildings to the mass of their group} = \frac{\text{value of buildings}}{\text{total net constant values} * 100}$$

This ratio indicates the relative importance of the building component of the physical assets relative to the total mass of fixed values of the statement of financial position.

$$\text{Relative weight of buildings to total assets} = \frac{\text{value of buildings}}{\text{total assets} * 100}$$

This ratio indicates the relative importance of the building component of physical fixed assets to the total assets of the statement of financial position.

$$\text{Relative weight of physical fixed assets to their mass} = \frac{\text{value of physical fixed assets}}{\text{total net fixed values} * 100}$$

This ratio indicates the relative importance of the group of material fixed assets in the net fixed value of the entity.

Relative weight of phy. fixed assets to total assets = value of phy fixed assets * Total assets * 100

This ratio indicates the relative importance of the group of physical fixed assets belonging to the net fixed value block relative to the sum of the asset elements in the statement of financial position.

$$\text{Relative weight of net constant values} = \frac{\text{net fixed values}}{\text{total assets} * 100}$$

This ratio indicates the relative importance of the net fixed value mass relative to the total assets of the statement of financial position.

The analyst follows the same approach for the rest of the fixed assets or other groups and the remaining blocks of the statement of financial position.

Vertical income statement analysis, the importance of vertical analysis of the income statement is increased compared with the statement of financial position. This is because the income statement is fully linked to an analysis whereby each item is tied to a central value, which is the net of sales except for some items of expenditure. The rest of the expenditure is affected to some extent by the level of sales and therefore it is useful to know the ratio of dollar / net sales absorbed by the various expenses incurred. The income statement is transferred to the relative distribution list as follows (Dahrawi, 1997, p. 234):

$$\text{Relative weight of cost of sales} = \frac{\text{cost of sales}}{\text{net sales} * 100}$$

This ratio indicates the relative importance of cost of sales item relative to net sales from income statement.

$$\text{Relative weight of operating expenses} = \frac{\text{operating expenses}}{\text{net sales} * 100}$$

This ratio indicates the relative importance of the operating expenses group to the net sales from the income statement. We follow the same approach for the rest of the operating expenses items and all incomes and their group in the income statement.

When analyzing, we look at the ratio of returns and allowances of sales to total sales, as sales can be high but with a high percentage of returns or allowances and the analyst concludes that there is a flaw in the policies of sale or product quality or both.

As for the analysis of the ratio of the cost of goods sold to sales, where the analyst checks the type of work of the enterprise because some of the work requires high costs by nature, for example, industrial enterprises that manufacture cars or machinery require high costs in production because of the high raw materials involved in production as well as high hand wages. However, companies that operate in the service field may not need a high cost of sales. These companies need other expenses that are not directly included in the cost of production, such as advertising expenses. These companies spend a lot of money to promote their products. It may not be spent by other industrial companies, therefore, the process of linking the type of business in this ratio is of great importance in the analysis process to judge whether this item is high or low relative to the net sales of the enterprise.

Therefore, the financial analyst should analyze the cost of sales elements very carefully to clarify the relative importance of each of them relative to the cost of sales and try to inquire about the rise in each element of the cost of sales by management and consider the possibility of obtaining alternative materials with less value while maintaining the quality of the product, considering the wages of labor. If these workers are highly efficient, they require these high wages or other workers with the same efficiency at low wages can be got, which reflects on the low cost of sales and thus increases the profits of the enterprise.

2.2.3. Ratio Analysis

This analysis is based on an assessment of the components of the financial statements through their relationship to one another or based on specific criteria in order to produce information on the indicators of the prevailing conditions in the specific enterprise (Khalil Shammaa, 1990, p. 17). Ratio financial analysis is based on a set of components and principles that rely on; the most important are as follows. Clearly define the objectives of financial analysis, by understanding the data contained in the financial statements to form a database that helps the financial analyst to make good decisions. The role of financial analysis is to reduce the financial statements to a minimum. Determine the financial period covered by the analysis and provide reliable financial data. Structure ratios appropriately, through a set of foundations used when extracting those ratios in a way that reflects the logical relationship between comparisons, such as the ratio of income to investments that caused them. The proper

interpretation of financial ratios, where it requires the development of sound explanations for each ratio, for example, the increase of liquidity in general does not mean that it is good, because the increase of liquidity ratio of acceptable limits means that disruption of resources and contrary to the goal of profitability. Therefore, the need for the existence of benchmark ratios comparable with the ratios derived through the joint financial analysis of the enterprise where they are consulted in the interpretation of the meanings of ratios. Qualifying the financial analyst in terms of knowledge and full knowledge of the internal and external environment of the enterprise, in order for the financial analyst to give a clear picture that reflects the real situation of the institution. The scientific and practical qualification must be available continuously (Aqel, 2006, p. 51).

Therefore, the financial statements required for financial analysis must have a set of characteristics that contribute to the most reliable results (Al-Husseini S. M., 1995, p. 23) which are: Convenience, Verifiable, Impartiality, Measurable, Possibility to be trusted.

2.2.4.1. Calculation of the Standard Ratio

Financial ratios are the most important financial analysis tools for financial statements and the most prevalent among financial analysts. It was one of the oldest such instruments emerged in the mid-nineteenth century when it was then used by users and stakeholders to make their economic decisions. And perhaps the most important that helped spread the ratios among analysts and the users that they are easily extracted, understood and reliable in evaluating performance and various aspects of activity (Al-Matarna, 2006, p. 127).

Financial ratios are defined as: "The relationship between one element to another, which is either in the form of a numerator $\frac{1}{2}$ or fraction decimal 0.5 or a percentage of 50%. They generally express a logical mathematical relationship between one element to another to measure the weight of the element to which they indicate (Zaid, 2009, p. 127). In financial analysis, financial ratios are defined as a relationship between two or more items of financial statements. Items that derive financial ratios may be on the same financial statement and may be on two financial statements (Matar M. , Recent Trends in Financial and Credit Analysis, 2006, p. 31).

Financial ratios are a useful tool in the study and survey phase of the financial situation of enterprises, but alone do not give a clear answer to the performance of the enterprise. The financial ratio itself may not mean many unless they are compared with other financial ratios (Fadala, 1995, p. 82). These other ratios use a comparative criterion; it is the criterion that gives financial ratios its meaning (Al-Zubaidi, 2000, p. 69).

The standard accounting ratios illustrate what should be the relationships between the elements contained in the financial statements, which are useful in making comparisons with the actual ratios. They are used as a tool to compare with the actual accounting ratios, leading to highlight the deviations that cause the financial analyst to search for the reasons leading to these deviations. The standard ratios must have the following characteristics (Hassbu, 1987, pp. 6-7):

- 1- The ratios are realistic, that is, they can be implemented. They do not assume idealism so that they cannot be achieved and lose their value as a goal to be achieved. They should not be humble and cause the executors to fail.
- 2- These ratios must be fairly stable and of limited ages, although this does not prevent the introduction of amendments if circumstances so require after conducting the necessary study.
- 3- To be characterized by simplicity, clarity, and ease of installation, and cannot tolerate more than one meaning.

There are several criteria that can be used when preparing standard ratios, including:

Absolute (typical) standards: ratios and rates that use a criterion to judge the status of enterprises, despite the different type of facility, age, industry, time of analysis and analyst purposes (Karajeh, Management and Financial Analysis, 2000). An absolute standard means an agreed state that it represents the formula for a particular event and is thus an inherent property that takes the form of a fixed monetary value of certain ratios common to all enterprises and measured by realistic fluctuations.

Historical standards: These are the criteria taken from the activities of the same enterprise for previous years, where the financial ratios are compared to the same enterprise for several years to get the general trend of the level of performance of the enterprise, whether for better or worse (Fadala, 1995, pp. 76-77).

Industrial standards: These are ratios and rates taken for a large group of enterprises belonging to one industry for a single period, and this criterion is useful in comparing the ratios of the enterprise with similar enterprises to know the relative financial position of the enterprise (Ramadan, 1990, p. 15). These standards are issued by professional associations, government agencies and other relevant entities for the purposes of measuring and evaluating one or more branches of industry or activity.

Management standards: These are the standards designed by management and based on the estimated budgets that precede the various project activities. These standards represent indicators of performance, evaluation, and the identification of deviations. These standards include other details of the performance of the enterprise, such as determining the ratios that the Department finds suitable for its activities in various fields; investing, financing, and operational (Ismail Ismail, 2000, pp. 84-85).

There can be an unspecified number of financial ratios that can be extracted from the financial statements, but the overuse and extraction of ratios can lead to blending and confusion, which makes it difficult to separate important and unimportant ratios. The use of a large number of accounting ratios on a large scale may be useful in some cases, but in many cases the use of a limited number of expressive ratios is sufficient and useful.

2.2.4.2. The Importance of Financial Ratios

An enterprise is almost free to use financial ratios in analyzing its accounting statements due to the importance of these ratios. The importance of accounting ratios stems from its ability to give a useful comparison between two variables. It explains this relationship between two items in a way that provides useful information that is understandable and easy to use. The importance of financial ratios is summarized in the following points (Andros, 2008, p. 81):

- ❖ Providing meaningful and useful connotations.
- ❖ Reviewing the trends of items in the financial statements.
- ❖ Comparing the enterprise with other enterprises belonging to the same sector.
- ❖ Comparing the enterprise with the approved industrial and standard ratios.
- ❖ Valuating the performance of the enterprise and the performance of its management.
- ❖ Identifying weaknesses and strengths in the enterprise and proposing recommendations and policies to address them.

Although the results of financial analysis methods, especially financial ratios, which are important for evaluating and predicting future financial performance of enterprises, there are some drawbacks to reliability and can lead to results that are not at the required level of accuracy, where they suffer from deficiencies from several angles that limit its effectiveness and its role as a scientific method when distinguishing and predicting the performance of the industrial enterprise (i.e., when used as a scientific method to distinguish and predict the success or failure of industrial enterprises).

In light of the above, the most important criticisms of financial analysis can be noted using financial ratios when predicting success or failure:

Financial ratios reflect the relationships between items in a state of rest, that is, a measure of performance over a previous period that does not reflect changes occurring over the years. They are also insufficient when used in assessing future financial policies in the context of the economics of the movement in which businesses operate (Fadala, 1995, p. 78). Financial ratios are derived from accounting data, many of which express the performance of an enterprise at a particular point in time, the moment when the financial statements are prepared, given the dynamic nature of the enterprise's activity and the fact that it is a continuing activity. It becomes difficult to rely on these ratios to predict future trends for the activities of the enterprise (Matar M. , Recent Trends in Financial and Credit Analysis, 2003, p. 78).

Where financial ratios are derived from the financial statements that reflect past events, not future events, they should be used to judge future events (Mostafa, 1999, p. 65). One aspect of deficiency when relying on the use of financial analysis, negative

financial ratios neglect the mutual effects of financial ratios and compare each other individually and sequentially, limiting their effectiveness in reaching objective results useful in distinguishing and predicting success or faltering, which requires the derivation of a set of accounting financial ratios with mutual effect.

Due to the large number of accounting financial ratios that can be extracted from the financial statements, it is difficult to determine the most able to distinguish between the enterprises capable of success and the non-performing enterprises, which leads to reduce their predictability (Fadil, 1998, p. 205). The financial ratios are concerned with accounting by highlighting some aspects of the financial situation of the enterprise, it is noticeable that there are some ratios that reflect the same information as other financial ratios, which complicate and hinder the process of financial analysis, which is known as the problem of linear duplication.

The traditional use of financial ratios limits the efficiency of these ratios to distinguish and predict success or faltering for the enterprise. Financial ratios have general implications when compared to the standard ratio, this ratio may be lower than the standard ratio. However, when compared to the failure of the enterprise, we find that it is sufficient and appropriate, as well as vice versa may be the financial ratio achieved (the ratio of gross profit for example) exceeds the standard ratio. However, we find that it is insufficient and inadequate as the enterprise achieves a net loss, and this means that we must look at the success and faltering of the enterprise as a complementary and not unilateral view. This requires a model consisting of an integrated and coherent set of clear, specific and explicit financial ratios for direct disclosure of the default of the enterprise, where the accountant can measure the default directly by analyzing and examining the financial statements taking into account the time dimension of these financial indicators in the disclosure and prediction of default (Ghareeb, 2001, p. 8).

The reliance on the traditional method of financial ratios when distinguishing enterprises leads to difficulty in predicting. The higher the financial ratios used for classification, the greater the number of classification groups, and they are interrelated. The higher the financial ratios used in the analysis, the more the dimensions of the analysis will be until we reach a degree with which it is difficult to reach the

boundaries between groups of enterprises, and with it, it is difficult to predict the performance of the enterprises in the future.

On this basis, the traditional use of financial ratios does not serve as an objective tool with a time dimension when distinguishing and predicting the success or failure of enterprises.

It is clear from the above that the traditional method of financial analysis using accounting financial ratios has limitations that diminish its effectiveness and this does not mean that it has no value, but on the contrary, the importance of financial analysis in recent times has increased very significantly. However, it needs to be developed to cope with variables and overcome weaknesses with it.

In order to achieve the desired purpose of financial analysis, the financial analyst must be informed of the weaknesses of financial ratios, which allows him to devise some means and methods to overcome them or at least make him aware of the extent to which he will go in adopting those ratios and draw conclusions.

(Johnson, 1971, p. 131) shows that to obtain a better analysis of the financial statements, statistical methods create collective considerations and interpretations of several ratios at the same time, enabling the financial analyst to obtain a better analysis of the financial statements than those obtained in the use of ordinary financial ratios.

2.3. Financial Ratios

Accounting ratios can be divided into four groups: (i) Liquidity ratios, (ii) Percentage of activity, (iii) Ratios of debt, (iv) Profit ratios and rates (Zaid, 2009, pp. 127-128).

2.3.1. Liquidity Ratios

The significance of these ratios is shown by measuring the financial appropriateness of the enterprise in the short term or the ability of the enterprise to pay its fixed financial obligations. The financial appropriateness of the enterprise shows the extent to which the current liabilities are covered by the enterprise's assets. This enterprise can convert these assets into cash in a period equal to the maturity of current liabilities. Failure to provide sufficient liquidity with the enterprise means the

possibility of financing risk and consequently the deterioration of the enterprise's credit arrangement. An enterprise's liquidity can be measured by its ability to meet its short-term liabilities when they fall due (Block, 1994, p. 59). The main measures of liquidity ratios are: (i) Current rate, (ii) Quick liquidity ratio, (iii) Net working capital.

Current rate: It is one of the most common financial ratios to measure the liquidity of the enterprise and measure the ability of the enterprise to meet its short-term obligations (Mayes, 2001, p. 89). Therefore, it indicates the margin of safety through the ability of current assets to cover current liabilities and that the rise of the ratio is a good indicator of the liquidity of the enterprise, and trading ratio is calculated as follows:

$$\text{Current Rate} = \frac{\text{Total Current Assets}}{\text{Total Current Liabilities}}$$

This ratio received the attention of analysts at the beginning of the last century, especially for the purposes of credit evaluation. A general criterion was set for this ratio of 2: 1, i.e., the current assets should be twice the current liabilities. Before we judge the liquidity of the enterprise through this ratio, we should research in the composition of current assets and how quickly they turn into cash. In addition, this ratio examines two elements of the statement of financial position (current assets and current liabilities) that were prepared at a particular time and thus reflects the liquidity position at the moment of the statement of financial position, which may change rapidly in the following moments.

Quick liquidity ratio: This ratio is measured by dividing current assets minus inventory by current liabilities (Youssef, 2012, p. 94):

$$\text{Quick Liquidity Ratio} = \frac{\text{Total Current Assets} - \text{Inventory}}{\text{Total Current Liabilities}}$$

The reason for excluding inventory when calculating the rapid liquidity ratio comes from two factors (F.Brigham, 2000, p. 94):

A- There are several items of inventory cannot be easily sold because they are complementary to other items.

B- Inventories are usually sold on a deferred basis (or converted into commodities ready for sale and then sold on debt). This means that they are converted into accounts receivable before they become cash. This ratio can be applied in industrial and commercial companies. As for companies that do not deal in inventories (do not have inventories), the ratio of rapid liquidity in them is equal to the percentage of trading, as is the case in the banking sector.

The researcher believes that in most accounting literature, the inventory is considered the most difficult elements to convert to cash, i.e., the slowest. Therefore, so often we find in these literatures inventory item minus the ratio of rapid liquidity from the numerator, but the research finds the need to study these elements before judging them. We may find other elements slowly converted into cash, such as bank receivables that are not deductible, then they must be added to the inventory component in the numerator of quick liquidity ratio.

Net working capital: There is no agreed general definition of working capital, and working capital is often referred to as the difference between current assets and current liabilities. Sometimes, it is referred to as a group of current assets, which is part of the funds that it is characterized by a low maturity profile, which is used to finance highly liquid assets (Consor, 1982, p. 8). The net working capital can be measured using the following formula:

$$\text{Net Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

This measurement is useful for internal control purposes at the enterprise and when obtaining a long-term debt, the loan agreement often includes a minimum net working capital that the enterprise must maintain. This condition protects creditors by requiring the enterprise to maintain good liquidity .The following figure shows briefly the liquidity ratios.

Table 2: The Liquidity Ratios

<i>Liquidity Ratios</i>	<i>Mathematical equation</i>	<i>Explanation</i>
<i>Trade rate</i>	Total Current Assets / Total Current Liabilities	Liabilities This ratio measures the extent of the enterprise's ability to pay its short-term liabilities from its current assets, and the increase in this ratio is a positive indication of the ability to pay in the short term.
<i>Quick liquidity ratio</i>	Quick liquidity ratio (Total current assets - inventory) / total current liabilities	This ratio measures the enterprise's ability to pay its short-term liabilities from its current assets, which have the advantage of being rapidly converted into cash (the fastest liquidity), so that it excludes inventory because it is slow to convert into cash, as well as excluding prepaid expenses.
<i>Net working capital</i>	Current assets - current liabilities	liabilities Net working capital represents the surplus of current assets over current liabilities, the increase of which indicates the company's ability to pay in the short term.

Source: Prepared by the researcher.

2.3.2. Percentage of Activity Ratios

This range of ratios is used to measure the ability of an enterprise to convert its balance sheet accounts into cash or sales. It is also used mostly to assess the performance of enterprises related to the short-term financial position as an indication of the company's activity at a specific date or time period, and also known as Assets Management Ratios, because it measures how efficient the management is in using its assets to produce the largest possible amount of goods and services. This ratio group is also called the Assets Management Ratio, which measures the efficiency of the enterprise's management in appropriately allocating its financial resources to various types of assets, as well as how efficient it is in using its assets to produce the largest possible number of goods and services, and achieving the largest volume of sales, and therefore the highest possible profit.

The activity ratios are based on the assumption that there is a reasonable balance between sales and the various types of assets such as inventories, receivables and fixed assets, and reveals any imbalance that may occur. The most important activity ratios include the following (Aqel, 2006, pp. 316-317):

A- Ratios and rates of turnover of current assets and liabilities including:

Accounts Receivable Turnover: It is also called the turnover rate of receivables and the average collection period; this ratio can be found by dividing the accounts receivable by the daily forward average. This ratio is sometimes called the average of the collection period and shows the average period that the enterprise is waiting for to get the price of the sold goods. The average forward sales can be found by dividing the annual forward sales by 365 considering that the number of days of the year is 365 days (Al-Rawi, 2010, p. 71).

These ratios are often used when the rate of circulation and the rapid liquidity ratio of a particular enterprise is below the industry average in order to ascertain the liquidity of this item (Aqel, 2006, p. 317). The turnover of accounts receivable is calculated as follows:

$$\frac{\text{Accounts receivable turnover}}{\text{times}} = \frac{\text{net forward sales}}{\text{average of balance of accounts receivable}}$$

(i.e., average receivables and notes receivables).

This ratio shows the turnover of receivables and notes receivables and becomes more significant by calculating the average collection period (credit period granted to debtors) as follows:

$$\text{Average collection period} = \frac{365 \text{ days}}{\text{turnover of receivables and notes receivables}}$$

This rate reflects the speed with which an enterprise is able to collect its debit accounts. It also expresses the appropriateness of the investment in debts and thus sheds light on the appropriateness of the credit and collection policy. The lenient policy in granting credit and collecting debts leads to a decrease in turnover and vice versa. It is noteworthy that this indicator does not serve as a comparison tool between the conditions of sale set by an enterprise or other similar enterprises.

Creditors turnover: This ratio is calculated as follows (Al-Husseini S. M., 1998, p. 283).

$$\text{Creditors turnover} = \frac{\text{net future purchases}}{\text{average of suppliers and notes receivables}}$$

This ratio shows the turnover rate of suppliers and notes payable, and becomes more significant by calculating the average repayment period (credit period), which is the period granted to the enterprise by creditors to pay, and this ratio is calculated as follows:

$$\text{Average repayment period} = \frac{365 \text{ days}}{\text{supplier turnover and payment notes}}$$

In order to study the status of the enterprise, it is preferable to compare the period granted to the debtors and the period taken from creditors. If the period granted is shorter than that taken from creditors, the position of the enterprise is good, especially on the liquidity side, and vice versa.

Inventory turnover: This ratio is calculated as follows:

$$\text{Inventory Turnover} = \frac{\text{Cost of Sales}}{\text{Inventory Average} * 100\%}$$

This ratio shows the speed of inventory movement, and the higher this ratio is, the higher indication of the efficiency of the enterprise will be, but it should be noted here that the rate of inventory turnover is related to the nature of economic activity practiced by the enterprise. The rate of turnover in industrial enterprises is usually lower than the turnover rates in commercial enterprises, and the level of rotation rates is lower. The average storage period can be calculated as follows:

$$\text{Average storage period} = \frac{365 \text{ days}'}{\text{inventory turnover}}$$

The shorter the storage period, the better the enterprise will be. The storage costs become less, the liquidity of the facility improves and its need for funds decreases, while the length of the storage period exceeds what must increase the risks of warehouse management. In order to judge the results, the necessary comparisons must be made with previous years, similar enterprises, and the benchmark for the sector to which the enterprise belongs.

B- Ratios or rates of assets turnover and equity:

Asset Turnover Average: This ratio is calculated as follows (Aqel, 2006, p. 325):

$$\text{Asset turnover} = \frac{\text{net sales}}{\text{total net assets} * 100}$$

This ratio shows the asset turnover and the rise in this ratio is a positive indicator, and we can divide this ratio into the following two ratios:

$$\text{Asset turnover} = \frac{\text{net sales}}{\text{net current assets} * 100}$$

$$\text{Asset turnover} = \frac{\text{net sales}}{\text{net fixed assets} * 100}$$

The turnover of current assets shows the efficiency of management in investing its financial resources (working capital) available in current assets. The contribution of these assets to the realized sales and the increase of this ratio is a good indicator of the efficiency of management of the enterprise. Likewise, for the fixed assets turnover rate, its rise is a good indicator.

Equity Turnover: This ratio is calculated as follows:

$$\text{Equity turnover rate} = \frac{\text{net sales}}{\text{average equity} * 100}$$

This ratio shows the contribution of each dollar of equity in sales, but the high turnover of equity does not necessarily increase the profits of the enterprise, as it is necessary to study the profitability of the invested funds because achieving more sales may be at the expense of profit rate.

This ratio can only be judged by comparing it with data from previous years, similar projects, or the benchmark of the sector to which the enterprise belongs.

Capital Turnover: This ratio is calculated as follows:

$$\text{Capital turnover} = \frac{\text{net sales}}{\text{average capital} * 100}$$

This ratio shows the contribution of each dollar of capital in sales, and its rise is a positive indicator. Some prefer it to the remaining ratios because the asset is the calculation of everything related to the capital of the enterprise originally provided by

the shareholders for investment, while some believe that the first rate is more advantageous because it takes into account the investment of funds available to the enterprise through capital plus reserves and retained earnings.

The rate of turnover of invested capital: This ratio is calculated as follows:

$$\text{Turnover of invested capital} = \frac{\text{net sales}}{\text{average invested capital}}$$

Net working capital turnover: This ratio is calculated as follows (Aqel, 2006, p. 326):

$$\text{Turnover rate of net working capital} = \frac{\text{net sales}}{\text{average net working capital}}$$

This ratio shows the efficiency of the management of the net working capital, and the higher this percentage is a positive indicator of the efficiency of the management of the net working capital will be.

Net working capital can be measured by the following formula:

$$\text{Net Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

2.3.3. Debt Ratios

The debt ratio measures the positive impact of an enterprise's debt on its financial returns. Where an enterprise can improve its financial returns by using debt, provided that the private funds differ from zero, and that the average cost of these debts is less than their economic returns, this means that borrowing should not be excessive because the enterprise will bear a cost and this leads to risks to which the enterprise is exposed. A limit on borrowing that cannot be crossed (Bouchenbaqar, 2010, pp. 89-90). The most common measures of indebtedness ratios are:

Debt Ratio: This ratio represents the percentage of all assets financed by debt. The larger this ratio, the greater the amount of the funds of the others (third parties) that have been relied upon in financing the assets. This ratio is calculated as follows:

$$\text{Debt Ratio} = \frac{\text{total liabilities}}{\text{total assets} * 100\%}$$

The higher these ratios, the more the firm uses financing from fixed payments to achieve a return. The focus may be on long-term debt, and short-term debt is ignored,

as it is assumed that it should be fulfilled in the short term i.e., during the performance of the normal course of business. The enterprise is not committed to making fixed payments over the long term.

Debt to Equity Ratio: This ratio refers to the relationship between long-term financing by third parties and those financed by owners. This ratio is calculated as follows:

$$\text{Debt to Equity Ratio} = \frac{\text{Long Term Loans}}{\text{Shareholders' Equity} * 100\%}$$

Companies with a relatively high amount of fixed assets and stable cash flows usually have a high ratio of debt to equity.

2.3.4. Profitability Ratios

There are many measures of profitability, which generally measure the profitability of an entity taking into account the level of sales, the size of assets, and the investments of owners and equity. There is no doubt that when the enterprise does not achieve profits, creditors and shareholders become concerned about the future of the enterprise and about the recovery of their money. Therefore, the creditors and the management of the company are interested in increasing profits because it protects the company from the risk of bankruptcy. A common tool for assessing the profitability of an enterprise is the relationship of income component ratios to sales (Gitman, 2003, p. 61), and there are many profitability ratios emanating from this group and the most frequently used ones are:

Profitability of sales: The study of the profitability of sales or sometimes-called (voluntary power of the enterprise) to know the ability of the enterprise to generate profits through sales and the study of profitability of sales through the following ratios:

Gross Profit Ratio: This indicator measures the ratio of gross profit to sales. The higher the ratio, the better for the enterprise (Al- Doori, 2003, p. 22). This ratio is calculated as follows:

$$\text{Gross Profit Ratio} = \frac{\text{gross profit}}{\text{net sales} * 100}$$

Net Profit Ratio: This ratio measures the remaining amount of each dollar of sales (as a percentage) after payment of all costs, including interests and taxes (Al-Nuaimi, 2008, p. 71). This percentage is considered one of the common and important criteria to measure the success of the enterprise in its operations, taking into consideration the return from sales. This percentage varies from industry to another and is calculated as follows:

$$\text{Net Profit Ratio} = \frac{\text{net profit}}{\text{net sales} * 100}$$

Profit margin of activity: This percentage is calculated as follows:

$$\text{Profit margin of activity} = \frac{\text{net operating profit before interests and taxes}}{\text{net sales} * 100}$$

This ratio shows the ability of one dollar of sales to create (generate) profit before subtracting interests and taxes. The rise of this ratio is a positive indicator of the enterprise, and this is the best ratio to measure the ability of the enterprise to cope with difficult circumstances, especially in relation to the changes in commodity prices, or in production costs, or in sales volume.

Profitability of invested funds: Profitability of invested funds is studied through a set of ratios that link profits to the invested funds in the establishment, whether these funds come from shareholders or both shareholders and lenders.

Rate of Return on Assets: This ratio is calculated as follows:

$$\text{Rate of return on assets} = \frac{\text{net profit after tax}}{\text{total net assets} * 100}$$

This ratio shows the rate of return on assets. The higher this ratio, the more positive indicator for the enterprise. Regarding the net income is generated during a financial period, it is not appropriate to measure the return on assets using the total assets at the beginning or end of the financial period, because both figures from one point of time. According to a technical point of view, the return on assets is calculated using the average operating assets (in some cases, there may be some unused assets and therefore excluded), i.e., the assets used to generate income during the financial period and not at the end or beginning. For example, if the net assets at the beginning of the year (1000) and at the end of the year (1200), it is better to calculate the average net assets as follows:

$$\frac{\text{Total Net Assets First Term} + \text{Total Net Assets at the End of Period}}{2}$$

I.e. $1000 + 1220 = 2200$

$2200/2 = 1100$ Average net assets.

Rate of Return on Equity: This ratio is calculated as follows:

$$\text{Rate of return on equity} = \frac{\text{net profit after tax}}{\text{average equity} * 100}$$

This ratio shows the entity's profit compared to the sources provided by the owners only, in contrast to the turnover rate of return on assets, which measures the performance of the enterprise through the use of income-generating assets. Generally, the higher the rate of return on equity the higher the profitability of the enterprise, and what was said about the adoption of net average of the fixed assets in the previous ratio applies to average equity.

Rate of return on invested capital: This ratio is calculated as follows:

$$\text{Rate of return on investor capital} = \frac{\text{net profit after tax} + \text{long term debt interest}}{\text{average invested capital (equity} + \text{long debt)}}$$

Invested capital is calculated in one of two ways:

- ❖ By the parties: Invested capital = equity + long- and medium-term debt.
- ❖ By the assets: Capital invested = net long-term assets + net working capital.

Profitability indicators are one of the main indicators used by management as well as other parties interested in the enterprise. Financial investors and analysts focus on previous profitability indicators to help them evaluate investment proposals in a particular enterprise. We also find that management focuses on these indicators, especially indicators related to sales profitability, to help them determine whether there is a section that contributes to the return on invested capital or not, and whether these sections provide good profitability or not (Al-Khalya, 1998, p. 72). Scientifically, profitability indicators are used in the following areas for decision-making:

- ❖ Decisions related to the identification of sources: the definition of the area to which the enterprise must direct its investments in a way that allows it to use its limited resources to obtain the maximum possible return.

- ❖ Control decisions: the evaluation of the performance of the sections in order to distinguish between who performs well and effectively, and why? and sections that perform poorly and ineffectively, and why?
- ❖ Decisions related to rewards and incentives: In order to reward outstanding employees who succeeded in their performance.

It should be noted that the net profit is the final outcome of the income statement, which is significantly affected by various administrative decisions, including accounting decisions relating to the selection of accounting methods and policies, including: (I) Choose the method of recognizing revenue that suits the circumstances of the enterprise, (ii) Estimation of the useful life of depreciable assets, scrap value and depreciation method, (iii) Estimation of doubtful debts.

Accounting analysis using financial ratios is one of the most important types of analysis and indispensable for the enterprise. It gives irreplaceable results to consider the financial position of the enterprise and the extent of its commitment to the objectives and plans set and know the deviations and glitches in order to evaluate them for the purpose of continuing the activity of the enterprise.

3. CHAPTER THREE: COMPARISON OF FINANCIAL PERFORMANCES

In this chapter, accounting data of technology companies are compared by using technique for order preference by similarity to ideal solution (TOPSIS) method for financial performance comprehension.

3.1. Methodology

The decision is an activity of choosing a strategy or action in problem solving. The act of choosing a strategy or action that the manager believes will provide the best solution (Saaty, 2004, p. 35) . The task of making decision levels is equivalent to the task of taking plans in the organization. Decision making is the leader's action to solve problems faced by the organization he leads by choosing one of the possible alternatives (V.Chichernea, 2014, p. 14). Indeed, decision making is a systematic approach to the nature of alternatives faced and taking actions that according to calculation are the most appropriate actions. Decision making holds the role of tang is very important because the decisions taken by the leader are the final thought that must be carried out by this subordinates or those who are associated with the organization led (al, 2017, p. 1). Decision making is a thought process to solve a problem to get the result to be implement.

The issue of decision-making in projects occupies the main concern in most of the companies implemented in developed countries. Where some of the executing companies may be exposed to financial losses or a decrease in expected profits during implementation as a result of weakness in the organizational structure or failure to adopt the ideal organizational structure that is able to provide the necessary data and information that helps the various administrative levels in monitoring and controlling project performance. So, there was a noticeable interest in developing multi-criteria decision-making methods. Including our thesis, which focuses on providing technology of preferential system in line with the ideal solution (TOPSIS) in assessing organizational structures in companies.

3.2. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) Method

The Technique for Order of Preference by Similarity to Ideal Solution is one of the a multi-criteria decision analysis method, which was originally developed by Ching-Lai Hwang and Yoon in 1981 (Yoon, 19881) with further developments by Yoon in 1987 (K.Yoon, 1987, p. 3), and Hwang, Lai and Liu in 1993 (Hwang, 1993, p. 8). It is a technique for compensatory accumulation that looks at a lot of alternatives of sets by distinguishing weighs for every criterion, normalizing scores for every standard and computing the geometric distance between every other option and the perfect other option, which is the best score in every model. Technique by Order Preference by Similarity to an Ideal Solution (TOPSIS) depends on the chosen alternative which ought to have the briefest geometric good ways from the positive ideal solution (PIS) and the longest geometric good ways from the negative ideal solution (NIS). Positive ideal solutions are characterized as the aggregate of all the best values that can be accomplished for each quality, while the negative ideal solution of all the most exceedingly terrible qualities accomplished for each property. TOPSIS is generally utilized for reasons; (i) the idea is basic and straightforward, (ii) Being able to gauge the general execution of decision choices in a straightforward scientific structure.

Now the steps of TOPSIS method are as follows:

Step 1. Calculation of the Decision Matrix:

A matrix is containing from the existing real data in which the rows are the alternatives, and the columns show the selected criteria. In this matrix, $f_{i,j}$ represent the value of alternative i

based on the criterion j .

$$r_{ij} = \frac{f_{ij}}{\sqrt{\sum_{j=1}^J f_{ij}^2}} \quad i = 1, 2, \dots, n \quad j = 1, 2, \dots, J$$

Step 2. Calculation of weighted normalized decision matrix:

Each element of this matrix $v_{i,j}$ can be calculated as follows

$$v_{ij} = w_i r_{ij} \quad i = 1, 2, \dots, n \quad j = 1, 2, \dots, J$$

Where w_i is the weight that we gave for each parameter?

Step 3. Determination of ideal (A^+) and negative ideal (A^-) solution:

As a way of working, we can specify the highest values in each column to embody the ideal solution, but regarding the worst solution, we do the opposite .

As $I' = \{i = 1, 2, \dots, n | n \text{ belongs to benefit criteria} \}$ benefit criterion implies a larger indicator value and a higher performance score and $I'' = \{i = 1, 2, \dots, n | n \text{ belongs to cost criteria} \}$ cost criterion implies a smaller indicator value and a higher performance score.

Step 4. Calculation of the separation measure:

Calculating the distance of each proposed solution for the ideal and negative ideal solution using the formula of calculating the distance with a dimension

$$D_j^+ = \sqrt{\sum_{i=1}^n (v_{ij} - v^+)^2} \quad j = 1, 2, \dots, J$$

$$D_j^- = \sqrt{\sum_{i=1}^n (v_{ij} - v^-)^2} \quad j = 1, 2, \dots, J$$

Step 5. Calculation of the relative closeness to the ideal solution (C_j^*):

$$C_j^* = \frac{D_j^-}{D_j^+ + D_j^-} \quad 0 < C_j^* < 1$$

Step 6. Ranking the preference order according to the descending order of C_j^* .

3.3. Data and Financial Ratios Used in Analysis

In this thesis, fifteen technology companies listed in Istanbul Stock Exchange Technology Index (XUTEK) are examined for three-year time period between 2017 and 2019 as presented in Table (3) We used just 15 of the XUTEK companies whose financial reports we can access for all 3 years.

Table 3: List of Analyzed Companies

ABBREVIATIONS	COMPANY NAME
ALCTL	ALCATEL LUCENT TELETAS
ARENA	ARENA BILGISAYAR
ARMDA	ARMADA BILGISAYAR
ASELS	ASELSAN
DESPC	DESPEC BILGISAYAR
DGATE	DATAGATE BILGISAYAR
ESCOM	ESCORT TEKNOLOJI
FONET	FONET BILGI TEKNOLOJILERI
INDES	INDEKS BILGISAYAR
KAREL	KAREL ELEKTRONIK
KRONT	KRON TELEKOMUNIKASYON
LINK	LINK BILGISAYAR
LOGO	LOGO YAZILIM
NETAS	NETAS TELEKOM.
PKART	PLASTIKKART

The ratios used in empirical analysis were obtained by companies' financial statements. Financial statements of companies were downloaded from official web site of Kamuyu Aydınlatma Platformu (KAP).

Ascertaining the competitiveness of the organizations in their own parts and assessing their money related exhibitions assume a play an important role for sectors improvement. Financial reports give activity and benefit data of firms. Thus, financial ratios proportions that have been determined from financial reports are well known too execution and budgetary circumstance. In the writing, the accompanying kinds of proportions are every now and again utilized. We will eight financial ratios are used in this thesis and financial ratios are picked as the assessment norms.

Table 4: Financial Ratios Used in Analysis

Symbols	Ratios	Target for TOPSIS
Ratio 1	Current Ratio	Maximum
Ratio 2	Cash Ratio	Maximum
Ratio 3	Working Capital Turnover	Maximum
Ratio 4	Debt Ratio	Minimum
Ratio 5	Interest Coverage Ratio	Maximum
Ratio 6	Net Profit Margin	Maximum
Ratio 7	Return on Total Assets	Maximum
Ratio 8	Return on Common Equity	Maximum

In terms of corporate financing, liquidity ratios describe the ability of a firm to pay off short-term debt obligations with cash on hand or short-term assets. Investors and lenders look to liquidity as a sign of financial security. On the other hand, companies with liquidity ratios that are too high might be leaving workable assets on the sideline. So that, target for liquidity ratios are unclear while using TOPSIS method. However, technology companies generally have high entrepreneurial passion and in a path to fast growth. They need to large amount of funds because of their characteristics. Based on this information, we assume that target for liquidity ratios (Ratio 1, 2 and 3) is maximization of them.

In this application Current Ratio is the ratio of liquidity that measures a company's ability to pay its short-term liabilities by relying on its assets and a good measure of the adequacy of working capital.

$$\text{Current Ratio} = \frac{\text{Total Current Assets}}{\text{Total Current Liabilities}}$$

Cash Ratio or Acid Test Ratio is A measure of the Company's liquidity ratio, whereby the measure calculates the company's ability to pay current liabilities using cash and cash equivalents only.

$$\text{Cash Ratio} = \frac{\text{Cash \& Cash Equivalents}}{\text{Total Current Liabilities}}$$

Working Capital Turnover, it is also called the turnover rate of net working capital, as this ratio measures the number of times that working capital rotates during one fiscal year and this ratio is calculated by:

$$\text{Working Capital} = \frac{\text{Net Revenue}}{\text{Current Assets} - \text{Short Term Liabilities}}$$

Debt Ratio is one of the ratios of the lending rate and is also referred to as the debt to assets ratio, which is a financial ratio that measures the strength of the company's financial leverage. The debt ratio gives us insight into the strength of the company as well as the potential risks the company faces in its debt burden requirements and it is calculating by:

$$\text{Debt Ratio} = \frac{\text{Total Liabilities}}{\text{Total Assets}}$$

Interest Coverage Ratio is that divides operating income by interest expense to show the company's ability to pay interest on its debt

$$\text{Interest Coverage Ratio} = \frac{\text{Income Before Interest and Taxes}}{\text{Annual Interest}}$$

Net Profit Margin or Gross profit margin, which is the amount of net income or resulting profit as a percentage of revenue. It is the ratio of net profits to revenues for a company or a business sector. The higher the profit margin, the greater the efficiency of the company in generating profits

$$\text{Net Profit Margin} = \frac{\text{Net Profit}}{\text{Revenues}}$$

Return on Assets is a forward-looking measure of the return on investment cash flow and is an indicator of the profitability of the company in relation to its total assets. The high ratio depends on the management of asset investments to achieve the maximum amount of revenue and control expenses to keep the net income high. Return on assets is the most comprehensive measure of profitability because it considers both the profitability of every dollar of revenue and sales volume

$$\text{Return on Assets} = \frac{\text{Net Profit}}{\text{Total Assets}}$$

Return on Common Equity also known as (Owners 'equity) or Stockholders' Equity, this is the money that is returned to the company's shareholders when all assets are liquidated. It is a more advantageous ratio to compare the company's profitability to other companies in the same industry than other companies

$$\text{Return on Common Equity} = \frac{\text{Net Profit}}{\text{Total Equity}}$$

3.4. Performance Measurement by TOPSIS

In this thesis, the financial data of fifteen technology companies, which are listed in ISEM for three-year period between 2017 and 2019, are used. First, eight financial ratios as criteria are calculated from their balance and revenue sheet for each firm by using a ratio analysis method. Then, decision matrices (15 x 8) are formed separately for the 2017, 2018 and 2019 years by using calculated eight financial ratios such as Current Ratio, Cash Ratio, Working Capital Turnover, Debt Ratio, Interest Coverage Ratio, Net Profit Margin, Return on Total Assets and Return on Common Equity (*Ratio1, Ratio2, …, Ratio8*) and fifteen decision points (firms). After this, the equal weights are given for each of eight criteria because ratios are of the same significance for this thesis and linguistic variables are not used. Total of weights must be one. So, the equal weight for each one is determined as 0,125. Finally, by using the TOPSIS method, the ranking of the firms according to their general performances is obtained.

In addition to the ranking financial performance of companies by TOPSIS, Bayramoğlu & Başarır, 2016 also calculated ranking index for each company. Firstly, Bayramoğlu & Başarır, 2016 ranked companies' financial performance by using TOPSIS method. After that, they gave a score to each company according to their rank at current year.

Similar to the Bayramoğlu & Başarır (2016) we decided to calculate ranking index scores for each company for each year. Our index calculation method is different from Bayramoğlu & Başarır (2016). Ranking index score calculation for each year is as follow.

Firstly, percentage of closeness to the ideal solution value estimated by TOPSIS are calculated for each company and each year by following formula.

$$\text{Percentage of } C^* = \frac{\text{Analyzed Company's Closeness to the Ideal Solution Value}}{\text{Sum of Closeness to the Ideal Solution Values of all Analyzed Companies}}$$

After that, Ranking Index Score was calculated by giving one point to each percent value.

$$\text{Ranking Index Score} = \frac{\text{Percentage of C}^*}{0,01}$$

Finally, the companies' financial performance can be ranked by ranking index scores for period 2017 – 2019.

3.5. Empirical Results

Calculation of TOPSIS method and empirical results are shown for each year separately. The ratios for 2017 in Table 1 are used for creating decision matrix.

Table 5: Original Data Matrix For 2017

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	2.1800	0.3600	2.2900	0.6000	20.9400	0.0500	0.0500	0.1200
ARENA	1.4400	0.1300	7.0900	0.6800	1.3500	0.0300	0.0100	0.0100
ARMDA	1.4400	0.1600	5.8000	0.7900	1.4600	0.0100	0.0200	0.0800
DESPC	2.1400	0.0800	4.7000	0.4600	1.9800	0.0300	0.0800	0.1500
DGATE	1.2400	0.1200	20.9000	0.7700	14.6100	0.0200	0.0700	0.3300
ESCOM	3.7900	0.1700	0.2000	0.0300	1.5700	0.9300	0.0200	0.0200
FONET	1.4900	0.5500	8.0400	0.1900	4.6700	0.1700	0.0800	0.1000
INDES	1.2000	0.1800	15.5100	0.8200	5.8500	0.0400	0.0900	0.4700
KAREL	1.8800	0.0400	2.2800	0.6200	1.1800	0.0700	0.0600	0.1500
KRONT	3.6100	0.2900	1.1600	0.2100	9.6200	0.3000	0.1700	0.2100
LINK	13.4100	9.9700	0.5800	0.1100	7.3500	0.4100	0.1600	0.1800
LOGO	1.4100	0.4500	5.4300	0.4500	6.8500	0.1900	0.1300	0.2400
NETAS	1.5200	0.2200	2.5400	0.5800	1.3700	0.0500	0.0300	0.0800
PKART	1.8600	0.2600	3.9700	0.4800	20.1900	0.0300	0.0500	0.0900
ASELS	2.1700	0.4700	1.7300	0.5400	3.4000	0.2500	0.1300	0.2700

Table 6: Normalized Decision Matrix For 2017

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0,1402	0,0359	0,0757	0,2840	0,5733	0,0445	0,1417	0,1515
ARENA	0,0926	0,0130	0,2344	0,3219	0,0370	0,0267	0,0283	0,0126
ARMDA	0,0926	0,0160	0,1918	0,3740	0,0400	0,0089	0,0567	0,1010
DESPC	0,1376	0,0080	0,1554	0,2178	0,0542	0,0267	0,2267	0,1893
DGATE	0,0797	0,0120	0,6910	0,3645	0,4000	0,0178	0,1984	0,4166
ESCOM	0,2437	0,0170	0,0066	0,0142	0,0430	0,8268	0,0567	0,0252
FONET	0,0958	0,0548	0,2658	0,0899	0,1278	0,1511	0,2267	0,1262
INDES	0,0772	0,0179	0,5128	0,3882	0,1602	0,0356	0,2551	0,5933
KAREL	0,1209	0,0040	0,0754	0,2935	0,0323	0,0622	0,1700	0,1893
KRONT	0,2321	0,0289	0,0384	0,0994	0,2634	0,2667	0,4818	0,2651
LINK	0,8622	0,9941	0,0192	0,0521	0,2012	0,3645	0,4535	0,2272
LOGO	0,0907	0,0449	0,1795	0,2130	0,1875	0,1689	0,3684	0,3029
NETAS	0,0977	0,0219	0,0840	0,2746	0,0375	0,0445	0,0850	0,1010
PKART	0,1196	0,0259	0,1313	0,2272	0,5527	0,0267	0,1417	0,1136
ASELS	0,1395	0,0469	0,0572	0,2556	0,0931	0,2223	0,3684	0,3408

To find normalized decision matrix, we used the formula $r_{ij} = \frac{f_{ij}}{\sqrt{\sum_{j=1}^8 f_{ij}^2}}$ and

find r_{ij} such that:

i = is raw.

j = is column

f_{ij}^2 = it is found by squaring the same ratio for each company, then the same ratio is collected for all companies and take the square root of the sum which is equal to r_{ij} . This applies to the rest of the years separately.

Table 7: Weighted Normalized Decision Matrix For 2017

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0,01752	0,00449	0,00946	0,03551	0,07166	0,00556	0,01771	0,01893
ARENA	0,01157	0,00162	0,02930	0,04024	0,00462	0,00333	0,00354	0,00158
ARMDA	0,01157	0,00199	0,02397	0,04675	0,00500	0,00111	0,00709	0,01262
DESPC	0,01720	0,00100	0,01942	0,02722	0,00678	0,00333	0,02834	0,02367
DGATE	0,00997	0,00150	0,08637	0,04557	0,05000	0,00222	0,02480	0,05207
ESCOM	0,03046	0,00212	0,00083	0,00178	0,00537	0,10335	0,00709	0,00316
FONET	0,01198	0,00686	0,03323	0,01124	0,01598	0,01889	0,02834	0,01578
INDES	0,00964	0,00224	0,06410	0,04852	0,02002	0,00445	0,03188	0,07416
KAREL	0,01511	0,00050	0,00942	0,03669	0,00404	0,00778	0,02126	0,02367
KRONT	0,02901	0,00361	0,00479	0,01243	0,03292	0,03334	0,06022	0,03314
LINK	0,10778	0,12426	0,00240	0,00651	0,02515	0,04556	0,05668	0,02840
LOGO	0,01133	0,00561	0,02244	0,02663	0,02344	0,02111	0,04605	0,03787
NETAS	0,01222	0,00274	0,01050	0,03432	0,00469	0,00556	0,01063	0,01262
PKART	0,01495	0,00324	0,01641	0,02840	0,06909	0,00333	0,01771	0,01420
ASELS	0,01744	0,00586	0,00715	0,03196	0,01164	0,02778	0,04605	0,04260

To find Weighted Normalized Decision Matrix, we used the formula $v_{ij} = w_i r_{ij}$ such that:

w_i = it is the relative weigh that is find by dividing 1 on the number of ratios.

$$w_i = \frac{1}{\text{the number of ratios}}$$

r_{ij} = it was found from the previous step.

Table 8: Positive Ideal Solution For 2017

Positive Ideal Solution (A^+)	0,1078	0,1243	0,0864	0,0485	0,0717	0,1034	0,0602	0,0742
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Table 9: Negative Ideal Solution For 2017

Negative Ideal Solution (A^-)	0,0096	0,0005	0,0008	0,0018	0,0040	0,0011	0,0035	0,0016
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To find the ideal, and (A^+) negative ideal solution (A^-), we must determine the highest value of ratio for all companies in each column which represent the ideal solution.

As for the negative ideal solution, we reverse by identifying the smallest values of the same ratio for all companies in each column.

Table 10: Distance from Positive Ideal Solution For 2017

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8	TOTAL	D_j^+ (Positive)
ALCTL	0,0081	0,0143	0,0059	0,0011	0,0000	0,0096	0,0018	0,0030	0,0440	0,2097
ARENA	0,0093	0,0150	0,0033	0,0015	0,0045	0,0100	0,0032	0,0053	0,0520	0,2281
ARMDA	0,0093	0,0149	0,0039	0,0020	0,0044	0,0105	0,0028	0,0038	0,0516	0,2272
DESPC	0,0082	0,0152	0,0045	0,0006	0,0042	0,0100	0,0010	0,0025	0,0463	0,2152
DGATE	0,0096	0,0151	0,0000	0,0019	0,0005	0,0102	0,0013	0,0005	0,0390	0,1975
ESCOM	0,0060	0,0149	0,0073	0,0000	0,0044	0,0000	0,0028	0,0050	0,0405	0,2012
FONET	0,0092	0,0138	0,0028	0,0001	0,0031	0,0071	0,0010	0,0034	0,0405	0,2013
INDES	0,0096	0,0149	0,0005	0,0022	0,0027	0,0098	0,0008	0,0000	0,0405	0,2011
KAREL	0,0086	0,0153	0,0059	0,0012	0,0046	0,0091	0,0015	0,0025	0,0488	0,2210
KRONT	0,0062	0,0146	0,0067	0,0001	0,0015	0,0049	0,0000	0,0017	0,0356	0,1887
LINK	0,0000	0,0000	0,0071	0,0000	0,0022	0,0033	0,0000	0,0021	0,0147	0,1212
LOGO	0,0093	0,0141	0,0041	0,0006	0,0023	0,0068	0,0002	0,0013	0,0387	0,1967
NETAS	0,0091	0,0148	0,0058	0,0011	0,0045	0,0096	0,0025	0,0038	0,0510	0,2259
PKART	0,0086	0,0146	0,0049	0,0007	0,0000	0,0100	0,0018	0,0036	0,0443	0,2104
ASELS	0,0082	0,0140	0,0063	0,0009	0,0036	0,0057	0,0002	0,0010	0,0399	0,1997

Table 11: Distance from Negative Ideal Solution For 2017

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8	TOTAL	D_j^- (Negative)
ALCTL	0,000	0,000	0,000	0,000	0,005	0,000	0,000	0,000	0,005	0,074
ARENA	0,000	0,000	0,001	0,000	0,000	0,000	0,000	0,000	0,001	0,030
ARMDA	0,000	0,000	0,001	0,000	0,000	0,000	0,000	0,000	0,001	0,026
DESPC	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,002	0,044
DGATE	0,000	0,000	0,007	0,000	0,002	0,000	0,000	0,003	0,012	0,112
ESCOM	0,000	0,000	0,000	0,002	0,000	0,010	0,000	0,000	0,013	0,114
FONET	0,000	0,000	0,001	0,001	0,000	0,000	0,001	0,000	0,004	0,061
INDES	0,000	0,000	0,004	0,000	0,000	0,000	0,001	0,005	0,010	0,102
KAREL	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,033
KRONT	0,000	0,000	0,000	0,001	0,001	0,001	0,003	0,001	0,008	0,088
LINK	0,010	0,015	0,000	0,002	0,000	0,002	0,003	0,001	0,033	0,181
LOGO	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,001	0,005	0,070
NETAS	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,022
PKART	0,000	0,000	0,000	0,000	0,004	0,000	0,000	0,000	0,005	0,073
ASELS	0,000	0,000	0,000	0,000	0,000	0,001	0,002	0,002	0,005	0,068

To find the distance of each proposed solution for the ideal and negative ideal solution, we used the formula of calculating the distance

$$D_j^+ = \sqrt{\sum_{i=1}^n (v_{ij} - v^+)^2} \quad j = 1, 2, \dots, J$$

$$D_j^- = \sqrt{\sum_{i=1}^n (v_{ij} - v^-)^2} \quad j = 1, 2, \dots, J$$

v_{ij} it was found from the second step and v^+, v^- found from third step.

Table 12: Closeness to Ideal Solution For 2017

	A^+	A^-	C^*
ALCTL	0,2097	0,0736	0,2598
ARENA	0,2281	0,0298	0,1157
ARMDA	0,2272	0,0261	0,1030
DESPC	0,2152	0,0444	0,1711
DGATE	0,1975	0,1115	0,3610
ESCOM	0,2012	0,1144	0,3625
FONET	0,2013	0,0613	0,2335
INDES	0,2011	0,1017	0,3358
KAREL	0,2210	0,0330	0,1300
KRONT	0,1887	0,0882	0,3186
LINK	0,1212	0,1808	0,5987
LOGO	0,1967	0,0698	0,2620
NETAS	0,2259	0,0223	0,0900
PKART	0,2104	0,0727	0,2567
ASELS	0,1997	0,0683	0,2548

To find relative convergence with the ideal solution, we used the formula:

$$C_j^* = \frac{D_j^-}{D_j^+ + D_j^-} \quad 0 < C_j^* < 1$$

Table 13: Ranking by TOPSIS for 2017

Rank	Company	C*	Percentage of C*	Ranking Index Scores
1	LINK	0,5987	0,15538	15,5378
2	ESCOM	0,3625	0,09409	9,4089
3	DGATE	0,3610	0,09368	9,3682
4	INDES	0,3358	0,08716	8,7162
5	KRONT	0,3186	0,08268	8,2683
6	LOGO	0,2620	0,06800	6,7996
7	ALCTL	0,2598	0,06743	6,7426
8	PKART	0,2567	0,06662	6,6616
9	ASELS	0,2548	0,06613	6,6134
10	FONET	0,2335	0,06060	6,0595
11	DESPC	0,1711	0,04440	4,4399
12	KAREL	0,1300	0,03374	3,3738
13	ARENA	0,1157	0,03002	3,0017
14	ARMDA	0,1030	0,02672	2,6721
15	NETAS	0,0900	0,02336	2,3364
	TOTAL	3,8532	%100	100

Highest C* score shows that this company had best financial performance for current year by comprehension with other companies. We calculated ranking index scores to each company by ranking index score formula shown at topic of 3.4. Calculation of ranking index score of LINKS as fallow.

$$\text{Percentage of C}^* = \frac{0,5987}{3,8532} = 0,1554$$

$$\text{Ranking Index Score} = \frac{0,1554}{0,01} = 15,5378$$

Company with highest C score (LINK) had 15,5378 ranking index scores, lowest one (NETAS) had 2,3364 ranking index scores in 2017.

The ratios for 2018 in Table 1 are used for creating decision matrix.

Table 14: Original Data Matrix for 2018

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	2.8300	0.5300	1.5500	0.5400	10.8800	0.0700	0.0600	0.1300
ARENA	1.6400	0.0900	6.4400	0.5900	1.2300	-0.0100	-0.0200	-0.0100
ARMDA	1.9400	0.3800	4.1000	0.7400	0.8500	-0.0006	-0.0008	-0.0005
DESPC	2.8200	0.0400	4.5800	0.3500	3.6900	0.0600	0.1700	0.2700
DGATE	1.7000	0.6000	8.6400	0.5600	9.1300	0.0200	0.0800	0.1800
ESCOM	4.6500	0.2400	0.1900	0.0300	-12.8000	-6.3400	-0.1200	-0.1300
FONET	0.9900	0.3900	-277.84	0.2800	18.4700	0.3400	0.1700	0.2300
INDES	1.3100	0.4100	11.480	0.7300	2.2500	0.0300	0.0800	0.3100
KAREL	1.4200	0.2000	3.8200	0.6500	1.1500	0.0900	0.0900	0.2500
KRONT	2.4000	0.6000	1.8100	0.2500	1.5200	0.1300	0.0800	0.1100
LINK	14.8300	11.5800	0.5400	0.1200	1.6600	0.6300	0.2300	0.2600
LOGO	1.7200	0.6100	3.3600	0.4300	5.9700	0.2100	0.1200	0.2100
NETAS	1.5400	0.1900	1.9000	0.5600	-1.0600	-0.0200	-0.0100	-0.0200
PKART	2.2800	0.7200	4.6600	0.3700	20.2700	0.0300	0.0700	0.1000
ASELS	2.4800	0.6700	1.3000	0.4800	2.6000	0.2600	0.1200	0.2300

Table 15: Normalized Decision Matrix for 2018

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0,1650	0,0453	0,0056	0,2846	0,3156	0,0110	0,1376	0,1773
ARENA	0,0956	0,0077	0,0231	0,3109	0,0357	-0,0016	-0,0459	-0,0136
ARMDA	0,1131	0,0325	0,0147	0,3900	0,0247	-0,0001	-0,0018	-0,0007
DESPC	0,1645	0,0034	0,0164	0,1844	0,1070	0,0094	0,3898	0,3682
DGATE	0,0991	0,0513	0,0310	0,2951	0,2648	0,0031	0,1834	0,2454
ESCOM	0,2712	0,0205	0,0007	0,0158	-0,3713	-0,9919	-0,2752	-0,1773
FONET	0,0577	0,0333	-0,9978	0,1476	0,5358	0,0532	0,3898	0,3136
INDES	0,0764	0,0350	0,0412	0,3847	0,0653	0,0047	0,1834	0,4227
KAREL	0,0828	0,0171	0,0137	0,3425	0,0334	0,0141	0,2064	0,3409
KRONT	0,1400	0,0513	0,0065	0,1317	0,0441	0,0203	0,1834	0,1500
LINK	0,8649	0,9892	0,0019	0,0632	0,0482	0,0986	0,5274	0,3545
LOGO	0,1003	0,0521	0,0121	0,2266	0,1732	0,0329	0,2752	0,2864
NETAS	0,0898	0,0162	0,0068	0,2951	-0,0307	-0,0031	-0,0229	-0,0273
PKART	0,1330	0,0615	0,0167	0,1950	0,5880	0,0047	0,1605	0,1364
ASELS	0,1446	0,0572	0,0047	0,2530	0,0754	0,0407	0,2752	0,3136

Table 16: Weighted Normalized Decision Matrix for 2018

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0,0206	0,0057	0,0007	0,0356	0,0395	0,0014	0,0172	0,0222
ARENA	0,0120	0,0010	0,0029	0,0389	0,0045	-0,0002	-0,0057	-0,0017
ARMDA	0,0141	0,0041	0,0018	0,0487	0,0031	0,0000	-0,0002	-0,0001
DESPC	0,0206	0,0004	0,0021	0,0231	0,0134	0,0012	0,0487	0,0460
DGATE	0,0124	0,0064	0,0039	0,0369	0,0331	0,0004	0,0229	0,0307
ESCOM	0,0339	0,0026	0,0001	0,0020	-0,0464	-0,1240	-0,0344	-0,0222
FONET	0,0072	0,0042	-0,1247	0,0184	0,0670	0,0066	0,0487	0,0392
INDES	0,0095	0,0044	0,0052	0,0481	0,0082	0,0006	0,0229	0,0528
KAREL	0,0104	0,0021	0,0017	0,0428	0,0042	0,0018	0,0258	0,0426
KRONT	0,0175	0,0064	0,0008	0,0165	0,0055	0,0025	0,0229	0,0187
LINK	0,1081	0,1236	0,0002	0,0079	0,0060	0,0123	0,0659	0,0443
LOGO	0,0125	0,0065	0,0015	0,0283	0,0216	0,0041	0,0344	0,0358
NETAS	0,0112	0,0020	0,0009	0,0369	-0,0038	-0,0004	-0,0029	-0,0034
PKART	0,0166	0,0077	0,0021	0,0244	0,0735	0,0006	0,0201	0,0170
ASELS	0,0181	0,0072	0,0006	0,0316	0,0094	0,0051	0,0344	0,0392

Table 17: Positive Ideal Solution for 2018

Positive Ideal Solution A^+	0,1081	0,1236	0,0052	0,0020	0,0735	0,0123	0,0659	0,0528
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Table 18: Negative Ideal Solution for 2018

Negative Ideal Solution A^-	0,0072	0,0004	-0,1247	0,0487	-0,0464	-0,1240	-0,0344	-0,0222
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Table 19: Distance from Positive Ideal Solution for 2018

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8	TOTAL	D_j^+ (Positive)
ALCTL	0,0077	0,0139	0,0000	0,0011	0,0012	0,0001	0,0024	0,0009	0,0273	0,1653
ARENA	0,0092	0,0151	0,0000	0,0014	0,0048	0,0002	0,0051	0,0030	0,0387	0,1967
ARMDA	0,0088	0,0143	0,0000	0,0022	0,0050	0,0002	0,0044	0,0028	0,0376	0,1940
DESPC	0,0077	0,0152	0,0000	0,0004	0,0036	0,0001	0,0003	0,0000	0,0274	0,1655
DGATE	0,0092	0,0137	0,0000	0,0012	0,0016	0,0001	0,0018	0,0005	0,0282	0,1681
ESCOM	0,0055	0,0147	0,0000	0,0000	0,0144	0,0186	0,0101	0,0056	0,0688	0,2624
FONET	0,0102	0,0143	0,0169	0,0003	0,0000	0,0000	0,0003	0,0002	0,0422	0,2053
INDES	0,0097	0,0142	0,0000	0,0021	0,0043	0,0001	0,0018	0,0000	0,0323	0,1798
KAREL	0,0096	0,0148	0,0000	0,0017	0,0048	0,0001	0,0016	0,0001	0,0326	0,1807
KRONT	0,0082	0,0137	0,0000	0,0002	0,0046	0,0001	0,0018	0,0012	0,0299	0,1730
LINK	0,0000	0,0000	0,0000	0,0000	0,0046	0,0000	0,0000	0,0001	0,0047	0,0685
LOGO	0,0091	0,0137	0,0000	0,0007	0,0027	0,0001	0,0010	0,0003	0,0276	0,1661
NETAS	0,0094	0,0148	0,0000	0,0012	0,0060	0,0002	0,0047	0,0032	0,0395	0,1986
PKART	0,0084	0,0134	0,0000	0,0005	0,0000	0,0001	0,0021	0,0013	0,0259	0,1608
ASELS	0,0081	0,0136	0,0000	0,0009	0,0041	0,0001	0,0010	0,0002	0,0279	0,1671

Table 20: Distance from Negative Ideal Solution For 2018

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8	TOTAL	D_j^- (Negative)
ALCTL	0,0002	0,0000	0,0157	0,0002	0,0074	0,0157	0,0027	0,0020	0,0438	0,2093
ARENA	0,0000	0,0000	0,0163	0,0001	0,0026	0,0153	0,0008	0,0004	0,0356	0,1886
ARMDA	0,0000	0,0000	0,0160	0,0000	0,0024	0,0154	0,0012	0,0005	0,0356	0,1886
DESPC	0,0002	0,0000	0,0161	0,0007	0,0036	0,0157	0,0069	0,0046	0,0477	0,2184
DGATE	0,0000	0,0000	0,0165	0,0001	0,0063	0,0155	0,0033	0,0028	0,0446	0,2112
ESCOM	0,0007	0,0000	0,0156	0,0022	0,0000	0,0000	0,0000	0,0000	0,0185	0,1359
FONET	0,0000	0,0000	0,0000	0,0009	0,0129	0,0171	0,0069	0,0038	0,0415	0,2038
INDES	0,0000	0,0000	0,0169	0,0000	0,0030	0,0155	0,0033	0,0056	0,0443	0,2105
KAREL	0,0000	0,0000	0,0160	0,0000	0,0026	0,0158	0,0036	0,0042	0,0422	0,2055
KRONT	0,0001	0,0000	0,0158	0,0010	0,0027	0,0160	0,0033	0,0017	0,0406	0,2015
LINK	0,0102	0,0152	0,0156	0,0017	0,0027	0,0186	0,0101	0,0044	0,0785	0,2801
LOGO	0,0000	0,0000	0,0159	0,0004	0,0046	0,0164	0,0047	0,0034	0,0455	0,2134
NETAS	0,0000	0,0000	0,0158	0,0001	0,0018	0,0153	0,0010	0,0004	0,0344	0,1854
PKART	0,0001	0,0001	0,0161	0,0006	0,0144	0,0155	0,0030	0,0015	0,0512	0,2263
ASELS	0,0001	0,0000	0,0157	0,0003	0,0031	0,0167	0,0047	0,0038	0,0444	0,2108

Table 21: Closeness to Ideal Solution For 2018

	A^+	A^-	C^*
ALCTL	0,1653	0,2093	0,5588
ARENA	0,1967	0,1886	0,4894
ARMDA	0,1940	0,1886	0,4929
DESPC	0,1655	0,2184	0,5690
DGATE	0,1681	0,2112	0,5569
ESCOM	0,2624	0,1359	0,3413
FONET	0,2053	0,2038	0,4981
INDES	0,1798	0,2105	0,5393
KAREL	0,1807	0,2055	0,5322
KRONT	0,1730	0,2015	0,5381
LINK	0,0685	0,2801	0,8036
LOGO	0,1661	0,2134	0,5623
NETAS	0,1986	0,1854	0,4827
PKART	0,1608	0,2263	0,5846
ASELS	0,1671	0,2108	0,5578

Table 22: Ranking by TOPSIS for 2018

Rank	Company	C^*	Percentage of C^*	Ranking Index Scores
1	LINK	0,8036	0,09912	9,9124
2	PKART	0,5846	0,07211	7,2115
3	DESPC	0,5690	0,07018	7,0179
4	LOGO	0,5623	0,06936	6,9356
5	ALCTL	0,5588	0,06893	6,8927
6	ASELS	0,5578	0,06881	6,8809
7	DGATE	0,5569	0,06869	6,8693
8	INDES	0,5393	0,06652	6,6523
9	KRONT	0,5381	0,06638	6,6377
10	KAREL	0,5322	0,06564	6,5640
11	FONET	0,4981	0,06144	6,1444
12	ARMDA	0,4929	0,06080	6,0804
13	ARENA	0,4894	0,06037	6,0370
14	NETAS	0,4827	0,05954	5,9544
15	ESCOM	0,3413	0,04210	4,2098
	TOTAL	8,1072	%100	100

Highest C* score shows that this company had best financial performance for current year by comprehension with other companies. We calculated ranking index scores to each company by ranking index score formula shown at topic of 3.4. Company with highest C score (LINK) had 9,9124 ranking index scores, lowest one (ESCOM) had 4,2098 ranking index scores in 2018.

The ratios for 2019 in Table 1 are used for creating decision matrix.

Table 23: Original Data Matrix For 2019

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0.2300	1.2800	0.5800	-5.5200	0.0100	0.0000	0.0100	2.2700
ARENA	0.1900	7.2600	0.6300	-1.6700	0.0100	0.0300	0.0700	1.5800
ARMDA	0.2800	5.6500	0.7500	-1.0200	0.0100	0.0100	0.0500	1.5000
DESPC	0.0400	3.6900	0.4800	-4.9500	0.0400	0.0800	0.1600	2.0600
DGATE	0.1400	6.4900	0.5500	-10.5000	0.0300	0.0900	0.1900	1.7800
ESCOM	0.2700	0.0600	0.0400	569.020	-14.32	-0.240	-0.250	8.7600
FONET	0.3200	16.6900	0.1600	-31.2400	0.3000	0.1800	0.2200	1.3200
INDES	0.2900	8.2600	0.7300	-1.2700	0.0200	0.0400	0.1300	1.3100
KAREL	0.0500	2.5400	0.5500	-2.5100	0.1400	0.1000	0.2300	1.5500
KRONT	0.6200	1.8700	0.2600	-1.8400	0.0900	0.0400	0.0600	2.2100
LINK	7.0000	0.5700	0.1400	-3.9300	0.4800	0.1800	0.2100	9.1400
LOGO	0.6300	3.1500	0.4900	-7.5800	0.2000	0.1100	0.2200	1.5500
NETAS	0.1300	2.1200	0.6200	0.3500	-0.1300	-0.0500	-0.1400	1.3300
PKART	0.6700	4.7600	0.4300	-59.6000	0.0400	0.0800	0.1400	2.0200
ASELS	0.4500	2.0900	0.4700	-3.6900	0.2600	0.1300	0.2500	1.8000

Table 24: Normalized Decision Matrix For 2019

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0,1606	0,0322	0,0551	0,2972	-0,0096	0,0007	0,0000	0,0149
ARENA	0,1118	0,0266	0,3123	0,3228	-0,0029	0,0007	0,0690	0,1046
ARMDA	0,1061	0,0392	0,2430	0,3843	-0,0018	0,0007	0,0230	0,0747
DESPC	0,1457	0,0056	0,1587	0,2460	-0,0086	0,0028	0,1840	0,2391
DGATE	0,1259	0,0196	0,2792	0,2818	-0,0183	0,0021	0,2070	0,2840
ESCOM	0,6197	0,0378	0,0026	0,0205	0,9927	-0,9988	-0,5521	-0,3736
FONET	0,0934	0,0449	0,7179	0,0820	-0,0545	0,0209	0,4140	0,3288
INDES	0,0927	0,0406	0,3553	0,3740	-0,0022	0,0014	0,0920	0,1943
KAREL	0,1096	0,0070	0,1093	0,2818	-0,0044	0,0098	0,2300	0,3437
KRONT	0,1563	0,0869	0,0804	0,1332	-0,0032	0,0063	0,0920	0,0897
LINK	0,6466	0,9812	0,0245	0,0717	-0,0069	0,0335	0,4140	0,3139
LOGO	0,1096	0,0883	0,1355	0,2511	-0,0132	0,0140	0,2530	0,3288
NETAS	0,0941	0,0182	0,0912	0,3177	0,0006	-0,0091	-0,1150	-0,2092
PKART	0,1429	0,0939	0,2047	0,2203	-0,1040	0,0028	0,1840	0,2092
ASELS	0,1273	0,0631	0,0899	0,2408	-0,0064	0,0181	0,2990	0,3736

Table 25: Weighted Normalized Decision Matrix For 2019

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8
ALCTL	0,0201	0,0040	0,0069	0,0371	-0,0012	0,0001	0,0000	0,0019
ARENA	0,0140	0,0033	0,0390	0,0404	-0,0004	0,0001	0,0086	0,0131
ARMDA	0,0133	0,0049	0,0304	0,0480	-0,0002	0,0001	0,0029	0,0093
DESPC	0,0182	0,0007	0,0198	0,0307	-0,0011	0,0003	0,0230	0,0299
DGATE	0,0157	0,0025	0,0349	0,0352	-0,0023	0,0003	0,0259	0,0355
ESCOM	0,0775	0,0047	0,0003	0,0026	0,1241	-0,1249	-0,0690	-0,0467
FONET	0,0117	0,0056	0,0897	0,0102	-0,0068	0,0026	0,0518	0,0411
INDES	0,0116	0,0051	0,0444	0,0468	-0,0003	0,0002	0,0115	0,0243
KAREL	0,0137	0,0009	0,0137	0,0352	-0,0005	0,0012	0,0288	0,0430
KRONT	0,0195	0,0109	0,0101	0,0167	-0,0004	0,0008	0,0115	0,0112
LINK	0,0808	0,1226	0,0031	0,0090	-0,0009	0,0042	0,0518	0,0392
LOGO	0,0137	0,0110	0,0169	0,0314	-0,0017	0,0017	0,0316	0,0411
NETAS	0,0118	0,0023	0,0114	0,0397	0,0001	-0,0011	-0,0144	-0,0262
PKART	0,0179	0,0117	0,0256	0,0275	-0,0130	0,0003	0,0230	0,0262
ASELS	0,0159	0,0079	0,0112	0,0301	-0,0008	0,0023	0,0374	0,0467

Table 26: Positive Ideal Solution For 2019

Positive Ideal Solution (S+)	0,0808	0,1226	0,0897	0,0026	0,1241	0,0042	0,0518	0,0467
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Table 27: Negative Ideal Solution For 2019

Negative Ideal Solution (S-)	0,0116	0,0007	0,0003	0,0480	-0,0130	-0,1249	-0,0690	-0,0467
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Table 28: Distance from Positive Ideal Solution For 2019

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8	TOTAL	D_i^+ (Positive)
ALCTL	0,0037	0,0141	0,0069	0,0012	0,0157	0,0000	0,0027	0,0020	0,0462	0,2150
ARENA	0,0045	0,0142	0,0026	0,0014	0,0155	0,0000	0,0019	0,0011	0,0412	0,2030
ARMDA	0,0046	0,0139	0,0035	0,0021	0,0155	0,0000	0,0024	0,0014	0,0433	0,2080
DESPC	0,0039	0,0149	0,0049	0,0008	0,0157	0,0000	0,0008	0,0003	0,0413	0,2031
DGATE	0,0042	0,0144	0,0030	0,0011	0,0160	0,0000	0,0007	0,0001	0,0395	0,1988
ESCOM	0,0000	0,0139	0,0080	0,0000	0,0000	0,0167	0,0146	0,0087	0,0619	0,2487
FONET	0,0048	0,0137	0,0000	0,0001	0,0171	0,0000	0,0000	0,0000	0,0357	0,1890
INDES	0,0048	0,0138	0,0021	0,0020	0,0155	0,0000	0,0016	0,0005	0,0402	0,2006
KAREL	0,0045	0,0148	0,0058	0,0011	0,0155	0,0000	0,0005	0,0000	0,0423	0,2056
KRONT	0,0038	0,0125	0,0063	0,0002	0,0155	0,0000	0,0016	0,0013	0,0412	0,2029
LINK	0,0000	0,0000	0,0075	0,0000	0,0156	0,0000	0,0000	0,0001	0,0232	0,1524
LOGO	0,0045	0,0125	0,0053	0,0008	0,0158	0,0000	0,0004	0,0000	0,0393	0,1984
NETAS	0,0048	0,0145	0,0061	0,0014	0,0154	0,0000	0,0044	0,0053	0,0519	0,2277
PKART	0,0040	0,0123	0,0041	0,0006	0,0188	0,0000	0,0008	0,0004	0,0411	0,2026
ASELS	0,0042	0,0132	0,0062	0,0008	0,0156	0,0000	0,0002	0,0000	0,0401	0,2003

Table 29: Distance from Negative Ideal Solution For 2019

	Ratio 1	Ratio 2	Ratio 3	Ratio 4	Ratio 5	Ratio 6	Ratio 7	Ratio 8	TOTAL	D_i^- (Negative)
ALCTL	0,0001	0,0000	0,0000	0,0001	0,0001	0,0156	0,0048	0,0024	0,0231	0,1520
ARENA	0,0000	0,0000	0,0015	0,0001	0,0002	0,0156	0,0060	0,0036	0,0269	0,1641
ARMDA	0,0000	0,0000	0,0009	0,0000	0,0002	0,0156	0,0052	0,0031	0,0250	0,1581
DESPC	0,0000	0,0000	0,0004	0,0003	0,0001	0,0157	0,0085	0,0059	0,0309	0,1757
DGATE	0,0000	0,0000	0,0012	0,0002	0,0001	0,0157	0,0090	0,0068	0,0329	0,1814
ESCOM	0,0043	0,0000	0,0000	0,0021	0,0188	0,0000	0,0000	0,0000	0,0252	0,1588
FONET	0,0000	0,0000	0,0080	0,0014	0,0000	0,0162	0,0146	0,0077	0,0480	0,2191
INDES	0,0000	0,0000	0,0019	0,0000	0,0002	0,0156	0,0065	0,0050	0,0293	0,1711
KAREL	0,0000	0,0000	0,0002	0,0002	0,0002	0,0159	0,0096	0,0080	0,0340	0,1844
KRONT	0,0001	0,0001	0,0001	0,0010	0,0002	0,0158	0,0065	0,0034	0,0270	0,1644
LINK	0,0048	0,0149	0,0000	0,0015	0,0001	0,0167	0,0146	0,0074	0,0600	0,2449
LOGO	0,0000	0,0001	0,0003	0,0003	0,0001	0,0160	0,0101	0,0077	0,0347	0,1862
NETAS	0,0000	0,0000	0,0001	0,0001	0,0002	0,0153	0,0030	0,0004	0,0191	0,1381
PKART	0,0000	0,0001	0,0006	0,0004	0,0000	0,0157	0,0085	0,0053	0,0307	0,1751
ASELS	0,0000	0,0001	0,0001	0,0003	0,0001	0,0162	0,0113	0,0087	0,0369	0,1920

Table 30: Positive Ideal and Negative Ideal Solution For 2019

	A^+	A^-
ALCTL	0,2150	0,1520
ARENA	0,2030	0,1641
ARMDA	0,2080	0,1581
DESPC	0,2031	0,1757
DGATE	0,1988	0,1814
ESCOM	0,2487	0,1588
FONET	0,1890	0,2191
INDES	0,2006	0,1711
KAREL	0,2056	0,1844
KRONT	0,2029	0,1644
LINK	0,1524	0,2449
LOGO	0,1984	0,1862
NETAS	0,2277	0,1381
PKART	0,2026	0,1751
ASELS	0,2003	0,1920

Table 31: Ranking by TOPSIS for 2019

Rank	Company	C^*	Percentage of C^*	Ranking Index Scores
1	LINK	0,6164	0,0884	8,8407
2	FONET	0,5370	0,0770	7,7014
3	ASELS	0,4894	0,0702	7,0196
4	LOGO	0,4842	0,0694	6,9437
5	DGATE	0,4771	0,0684	6,8421
6	KAREL	0,4728	0,0678	6,7806
7	DESPC	0,4638	0,0665	6,6520
8	PKART	0,4636	0,0665	6,6489
9	INDES	0,4604	0,0660	6,6027
10	KRONT	0,4475	0,0642	6,4184
11	ARENA	0,4471	0,0641	6,4123
12	ARMDA	0,4319	0,0619	6,1939
13	ALCTL	0,4142	0,0594	5,9409
14	ESCOM	0,3896	0,0559	5,5883
15	NETAS	0,3775	0,0541	5,4146
	TOTAL	6,97259	%100	100

Highest C* score shows that this company had best financial performance for current year by comprehension with other companies. We calculated ranking index scores to each company by ranking index score formula shown at topic of 3.4. Company with highest C score (LINK) had 8,8407 ranking index scores, lowest one (NETAS) had 5,4146 ranking index scores in 2018.

Table (32) has been prepared in order to show the financial performance rankings of companies for 2017 - 2019 collectively. The companies were ranked by total ranking index scores for 2017 - 2019 at Table (32).

Table 32: Financial Performance Index of Technology Companies (2017-2019)

Rank	Company	Ranking Index Scores			
		2017	2018	2019	TOTAL
1	LINK	15,5378	9,9124	8,8407	34,2909
2	DGATE	9,3682	6,8693	6,8421	23,0796
3	INDES	8,7162	6,6523	6,6027	21,9711
4	KRONT	8,2683	6,6377	6,4184	21,3244
5	LOGO	6,7996	6,9356	6,9437	20,6788
6	PKART	6,6616	7,2115	6,6489	20,5220
7	ASELS	6,6134	6,8809	7,0196	20,5139
8	FONET	6,0595	6,1444	7,7014	19,9053
9	ALCTL	6,7426	6,8927	5,9409	19,5762
10	ESCOM	9,4089	4,2098	5,5883	19,2069
11	DESPC	4,4399	7,0179	6,6520	18,1097
12	KAREL	3,3738	6,5640	6,7806	16,7184
13	ARENA	3,0017	6,0370	6,4123	15,4509
14	ARMDA	2,6721	6,0804	6,1939	14,9464
15	NETAS	2,3364	5,9544	5,4146	13,7054
THRESHOLD VALUE					20

As can be seen from Table (32), the companies with the most successful financial performance for the years 2017 - 2019 are LINK, DGATE and INDES. The companies with the worst financial performance for the years 2017 - 2019 are NETAS, ARMDA and ARENA.

The standard value for good financial performance could be emblemized by threshold value. Companies with a ranking index points higher than the threshold value can be considered as financially successful and vice versa (Bayramođlu & Bařarrı, 2016). Threshold value of total ranking index points is 20 for technology companies which analyzed in this thesis for 2017 – 2019. Considering this information, it can be said that the LINK, DGATE, INDES, KRONT, LOGO, PKART, ASELS are financially successful and FONET, ALCTL, ESCOM, DESPC, KAREL, ARENA, ARMDA, NETAS are financially less than ideal position.

CONCLUSION

Information technology (IT) sector combine manufacturing and services industries. The IT sector contributes to technological progress, output and productivity growth. Its impact can be examined in several ways: directly, through its contribution to output, employment, or productivity growth, or indirectly, as a source of technological change affecting other parts of the economy, for instance. Considering this information, it can be said that the IT companies have key role on the economic growth of countries. Therefore, we decided to focus on financial performance analysis of IT companies.

In Turkey, The IT sector's average growth rate is %17 in 5 years. There are large-sized local and international companies in the ecosystem of IT. Early stage investments in IT companies in Turkey are on the rise. In addition, The Ministry of Industry and Technology has given large amount incentives to the IT companies as tax deduction, value added tax exemption, customs duty exemption, interest rate support, land allocation. So that, financial performance analysis of IT companies is one of the important issues for economists, investors and policy wonk institutions.

Ratio analysis is the most used method to analyze financial performance of companies. In general, the financial analysis ratios could be classified into the following four groups: liquidity ratios, activity efficiency ratios, debt ratios and profitability ratios. There are too many ratios to analyze the financial performance. According to the literature analysis, we decided to use 8 ratios which are mostly used as Current Rate, Cash Ratio, Working Capital Turnover, Debt Ratio, Interest Coverage Ratio, Net Profit Margin, Return on Total Assets and Return on Common Equity.

To make financial performance ranking of IT companies, we used TOPSIS method which is one of the multi-criteria decision-making methods. TOPSIS is one of the most used methods at social sciences studies to make ranking. In addition to the ranking financial performance of companies by TOPSIS, we decided to calculate ranking index scores for each company for each year similar to the Bayramoğlu & Başarır (2016)'s study. Our index calculation method differs slightly from Bayramoğlu & Başarır (2016).

In this thesis, fifteen IT companies listed in Istanbul Stock Exchange Technology Index (XUTEK) are examined for three-year time period between 2017 and 2019.

According to the ranking index scores for whole period of 2017 – 2019, it can be said that financial performances of LINK, DGATE, INDES, KRONT, LOGO, PKART, ASELS were better than average. Contrary to this, financial performance of FONET, ALCTL, ESCOM, DESPC, KAREL, ARENA, ARMDA, NETAS were worse than average.

The purpose of ranking is to find financially successful companies and examine the financial structures of these companies. For this purpose, the average value of each ratio has been calculated for companies that are considered financially successful (LINK, DGATE, INDES, KRONT, LOGO, PKART and ASELS). In the study, these average values were described as optimum ratio values for technology companies. Calculated optimal values of each ratio are as below.

Table 33: Calculated Optimal Values of Ratios

Current Rate	Cash Ratio	Working Capital Turnover	Debt Ratio	Interest Coverage Ratio	Net Profit Margin	Return on Total Assets	Return on Common Equity
1,8917	0,4544	5,1552	0,4471	7,9479	0,1748	0,1071	0,2090

According to the analysis, we note that the current ratio of financially successful technology companies should be greater than 1.8917. This ratio is very important because it measures the number of times a current asset covers the current liabilities. Technology companies need more funds than other sectors due to their high growth rate. However, companies have difficulties in finding funds, especially in countries with less developed capital markets. Therefore, companies generally must be financed by short- and medium-term debt. In finance literature, the current ratio is recommended to be above 2. However, considering the reasons listed, we suggest that a current ratio above 1.8917 would be sufficient for technology companies in Turkey.

The average of cash ratio of financially successful companies was calculated as 0.4544. Recommended cash ratio is above 0.20 in finance literature. In the technology sector where mergers and acquisitions are common, high cash ratio can be considered normal. According to our findings, technology companies should have more cash and cash equivalents than other sectors. At this point, the important issue is that current

assets are used efficiently, or not. Working capital turnover ratio gives us information on whether current assets are used effectively or not. Working capital turnover ratio also indicates the equilibrium or imbalance of the performance of the productive activity with the efficiency of the performance of the selling activity. The higher the rate of working capital turnover, the evidence that the efficiency of the production activity is balanced with the efficiency of the performance of the selling activity. The average of working capital turnover ratio is calculated as 5.1552. According to 5.16, it can be said that seven companies are running smoothly and have limited need for additional funding. A high ratio may also give the business a competitive edge over similar companies. Based on this assumption, it can be suggested that enterprises in the technology sector make moves that will increase the working capital turnover rate above 5.

Whether or not a debt ratio is good depends on the contextual factors; it is hard to come up with an absolute number. From a pure risk perspective, 0.4 or lower ratios are considered better debt ratios for developed economies. For developing economies, 0.5 – 0.6 debt ratio are considered normal. We found that financially successful technology companies' debt ratio average is 0.4471. Debt ratio measures the percentage of funds obtained from borrowers and includes loans. Lower debt ratio means the greater the margin of safety for creditors in the event of the company declaring bankruptcy and selling its assets. In Turkey, creditors generally prefer 50% or less debt ratio to borrow money more easily. It can be said that the average ratio of 0.4471 makes it easier for technology companies to access funds. It should be noted that access to funds is very important for fast growing businesses.

In addition to the debt ratio, interest coverage ratio is also very important to access to funds. Interest coverage ratio is a measure of the number of times the company can make interest payments on its debt with its earnings before interest and taxes. We calculated that the average of financially successful technology companies' interest coverage ratio is equal to 7.9479. An interest coverage ratio of 2 is often an acceptable standard. Considering this standard, we can say that examined seven technology companies have great financial power to pay their debts. Creditors often compare businesses in any sector with each other. Therefore, it can be suggested that technology companies have an interest coverage ratio of at least 7.95.

For profitability analysis, we used Net Profit Margin, Return on Total Assets and Return on Common Equity Ratios. These indicators are especially used to compare the performance of companies in the same industry. The profitability analysis of this study show that optimal profit ratios should be over 0,1748 for Net Profit Margin, 0,1071 for Return on Total Assets and 0,2090 for Return on Common Equity.

Further studies that will make comparisons for technology sectors of different countries are thought to be complementary to this study. It is thought that comparing the companies of developed economies with the companies of developing economies will make a significant contribution to both businesses and other interest groups.

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(2011-2012) mezun oldu.

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Bankalarda Muhasebe" başlıklı bir araştırmam var.