

**Curtin Business School**

**Improving the Performance of Accounting Information Systems of  
Commercial Banks in Jordan by using the Balanced Scorecard  
Approach**

**Mohammad Naser Mousa Hamdan**

**This thesis is presented for the Degree of**

**Doctor of Philosophy**

**of**

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# Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

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# List of Abbreviations

<b>AIS</b>	Accounting Information System
<b>BSC</b>	Balanced Scorecard
<b>IS</b>	Information System
<b>IT</b>	Information Technology
<b>KPIs</b>	Key Performance Indicators
<b>AHP</b>	Analytical Hierarchy Process
<b>ANP</b>	Analytical Network Process
<b>SPSS</b>	Statistical Package for Social Sciences
<b>MIS</b>	Management Information System
<b>EPS</b>	Earnings Per Share
<b>ROI</b>	Return On Investment
<b>ROA</b>	Return On Assets
<b>ROE</b>	Return On Equity
<b>ROS</b>	Return On Sales
<b>JIT</b>	Just In Time
<b>AMT</b>	Advanced Manufacturing Technology
<b>CEO</b>	Chief-Executive Officer
<b>ABC</b>	Activity-Based Costing
<b>USA</b>	United States of America
<b>FAHP</b>	Fuzzy Analytic Hierarchy Process
<b>NHS</b>	National Health Service
<b>CLD</b>	Causal-Loop Diagram
<b>PMS</b>	performance measurement system
<b>F</b>	Financial Perspective
<b>C</b>	Customer Perspective
<b>IBP</b>	Internal Business Process Perspective
<b>L&amp;G</b>	Learning and Growth Perspective
<b>IC</b>	Internal Control Perspective
<b>KPI F-1</b>	Business Revenue
<b>KPI F-2</b>	Productivity Growth
<b>KPI F-3</b>	Exploitation of Assets
<b>KPI F-4</b>	Cash Flow
<b>KPI C-1</b>	Customer Satisfaction
<b>KPI C-2</b>	Reputation or Goodwill
<b>KPI C-3</b>	Service Features
<b>KPI C-4</b>	Attraction Marketing
<b>KPI IBP-1</b>	Strategic Planning
<b>KPI IBP-2</b>	Transaction Processing
<b>KPI IBP-3</b>	Emerging Technologies
<b>KPI IBP-4</b>	Legislation
<b>KPI L&amp;G-1</b>	Job Satisfaction
<b>KPI L&amp;G-2</b>	Innovation and Novelty
<b>KPI L&amp;G-3</b>	Training and Skill
<b>KPI L&amp;G-4</b>	Knowledge Flow

<b>KPI IC-1</b>	Regulatory Controls
<b>KPI IC-2</b>	Access Controls
<b>KPI IC-3</b>	Processing Operations
<b>KPI IC-4</b>	Control Inputs and Outputs
<b>EI</b>	Equally Important
<b>WMI</b>	Weakly More Important
<b>SMI</b>	Strongly More Important
<b>VSMI</b>	Very Strongly More Important
<b>AMI</b>	Absolutely More Important
<b>TFN</b>	Triangular Fuzzy Number

# Abstract

The continuous development of information technology in the modern world affects the performance of Accounting Information Systems (AIS) in Jordanian business organizations, including commercial banks, in many respects, including: its objectives, strategies, nature of work and instruments that achieve its objectives. Hence, the traditional AIS needs to be reviewed since it requires new instruments to determine, measure and present accounting information in order to adapt to the requirements of modern technology and competition factors.

The problem of this study stems from the ignorance of some commercial banks in Jordan about the impact of AIS on the level of banks' success in performing their various banking business, indicating that AIS is not used efficiently and effectively. Also, the problem stems from the great interest in AIS from other commercial banks in Jordan, although they are unable to take full advantage of AIS and what it can offer. With the prominent presence and effective role that could be played by companies of systems, programs and communications in Jordan in formulating the level of service performance of banks in Jordan, ignorance of AIS on the part of these commercial banks would negatively impact on their market share and effective performance, bilaterally, jointly, and their competitive position. Despite the argument of many commercial banks in Jordan that AIS is an important aspect of their daily operations, there are still some factors that limit the effectiveness of AIS performance. Hence, various critical problems emerged for the commercial banks, which are the main problems addressed by this study. First, specific technology in any AIS field might prevent it from being effective; second, it may prevent the production of credible information for stakeholders; third, it will hinder any technical progress in its control operations. This would negatively affect bank's performance in terms of providing highly efficient, low-cost services, and decrease its competence and competitiveness both internally and externally.

Considering the negative reflections discussed in the previous section, it is noted that the impact of Key Performance Indicators (KPIs) problems on AIS performance in the commercial banks in Jordan is a pressing and significant issue, especially in the KPIs field that enhances AIS performance. The problem that the researcher identifies to solve in this study is: What are the KPIs that will improve the accounting information systems'

performance in the commercial banks in Jordan? This needs to address the question arising from the absence of a strategic vision in the literature to develop and improve the AIS professional performance in commercial banks in Jordan. Also, it highlights the importance of investigating the KPIs that lead to improving AIS performance in the commercial banks in Jordan.

To improve AIS performance in commercial bank in Jordan, Balance Scorecard (BSC) as an integrated system of performance measures from the financial and non-financial perspectives, such as: financial, customers, internal business process, learning and growth, and internal control have been used. KPIs related to these perspectives were revealed and identified classified, and their relationships with, and their effects and influence on, the effectiveness of AIS performance in those banks, were examined. On the other hand, analyses were made for the all BSC-AIS elements and their effect on the performance of work strategies and tendencies by using Analytical Hierarchy Process (AHP) and Analytical Network Process (ANP). The researcher also tested BSC-AIS in the field part, on the society, with emphasis on basic performance improvement stimulants AIS-KPIs, through analysing the questionnaire's results, using the Statistical Package for Social Sciences (SPSS) programme. Then, analysed each element based on each of the five perspectives. A comparison was conducted between the analysis results of SPSS and analysis results of AHP/ANP, in order to get final KPIs to be adopted as a basic criterion to conduct the comparison between fact and the expected AIS future performance. Furthermore, the study suggests ten recommendations to be implemented by the commercial banks in Jordan in order to improve the performance of AIS.

Finally, the study produced results that facilitate the establishment of a comprehensive AIS strategy intended to achieve, and maintain a competitive advantage, provide the attributes that produce comprehensive information for different stakeholders, improve and maintain the internal control systems. This study concluded that all of these elements together lead to the development and improvement of AIS performance in the commercial banks in Jordan, thereby improving AIS operational performance with different materiality determined by the relationship between the target elements and objectives.

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# Chapter 1 -

## Introduction

### 1.1 Preface

The world is witnessing steady developments in several fields. Most of these developments are in Information Technology (IT), which consequently affect most business organizations. Besides IT, this development has been accompanied by a huge expansion in the finance and business world. There are two significant factors responsible for the changes in the business environment [1-3]:

- The first factor is the emergence and globalization power.
- The second factor is the change of the industrial economy into knowledge and information-based service economics.

Many business organizations have emerged around the world and this has contributed to the growth of data, which has become a characteristic of this era. Up until 1980, information was not one of the most important assets of business organizations, since most of them viewed it as a secondary high-cost product. However, the situation is now different, since it is considered to be one of the important assets of an organization, the significance of which is no less than that of the financial, human or other significant resources in the business organization. With the increased rate of information growth, accounting in business has an important role to play. Accountants soon integrated an information system (IS) into their accounting practice, the purpose of which was to gather information and store data related to organizational activities and incidents. Also, the processing of data to convert it into information, facilitated decision-making, and enabled management to plan, implement and control activities, and provide a control system to protect related assets and data [4-6]. Such systems play a significant role in accounting practices, and business organizations rely on the application of Accounting Information Systems (AIS) to maintain their competitiveness in the market, especially in terms of the information that such business organizations need to preserve. Productivity is one of the most significant factors that assist an organization to

compete successfully with other business organizations; moreover, productivity is positively linked to the effectiveness of a business organization's IS [7]. The rapid changes in business organizations in terms of market competitiveness, and the developments in IS and its applications, have motivated many business organizations to adapt to such developments in general and IS in particular. This adaptation was intended to assist business organizations to cope with changes in competitiveness, thereby helping them to survive and be viable by implementing modern methods and technology. This development in AIS was accompanied by an obvious and great interest in assessing performance success and effectiveness, and the extent to which it can cater for users' information needs and financial statements of various jobs and management levels [8]. The process of AIS assessment is a significant issue in developing and improving such a system, in terms of its positive effects on the accounting systems for the concerned parties, on the one hand, and as its overall effect on a business organization's performance, which enhances position in the market [9, 10]. In the next section, the researcher discusses the significance of AIS applications in various areas of business organizations.

## **1.2 The Significance of Accounting Information System (AIS) Applications for Business Organizations**

In accordance with the development of IT/IS systems in organizations discussed above, AIS applications have resulted in massive developments in business organizations. These applications have influenced the practices of numerous public and private business organizations of various types, and it is difficult to find any businesses that are currently not using such applications, in one way or another. The various applications of AIS will be discussed in the following paragraphs. Figure 1.1 shows the AIS applications and its effect on the different areas of business organizations.



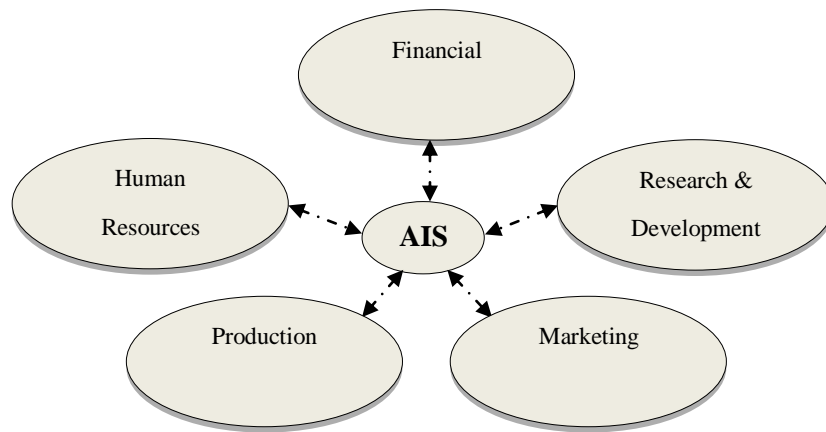


Figure 1.1: AIS applications and the areas of business organizations

- In the area of production, AIS provides applications relating to production volume, quality, customer service through accounting programs, control systems, stock control purchase management systems, and sales management systems, etc. Specifically, AIS increases production volume and reduces costs by making use of the ideal cost volume production. It also facilitates the integration of the main and subsidiary systems in business organizations to eliminate improvised endeavors, and duplication of tasks, thereby expediting outcomes and reducing the time required to achieve task objectives [11].
- In the area of finance, AIS facilitates the execution of financial applications by obtaining, using and controlling monies and increasing efficiency in distribution, providing financial liquidity from internal and external sources, controlling various cash flows by consistent registration, and monitoring financial operations. This gives the business organization the ability to obtain regular and periodic reports on its financial status and cash flows within a specific period of time. AIS also helps to minimize the continuous control of both the fixed and fluctuating costs, thus enabling the rationalization of spending and increasing profits, by providing an assessment of financial performance regarding liquidity, profitability and indebtedness [12, 13].
- In the area of marketing, AIS applications play a significant role in the success of a business organization by providing marketing researchers with an effective means of obtaining data and information, thereby facilitating market assessment. This

contributes to the development of products and services required to meet the clients' requirements, thus distinguishing an organization from its competitors. It also contributes to decreasing distances between marketing areas, minimizing costs and facilitating the monitoring of products and stock volume.

- In the area of human resources, AIS applications increase concordance between individuals and jobs by assisting with the efficient selection of qualified personnel, training and assessment of their performance, planning their job pathway, managing payroll, and improving task types and the work environment. Also, through its various tools, AIS can improve the efficiency of the communication process, provide incentives and motivations to individuals through the enrichment and enhancement of jobs, thereby developing a data base for human resources [14].
- In the area of research and development, AIS applications play a significant role by developing the knowledge required by management and staff. This assists personnel to design new products and services, develop the current ones, and improve production operations in the business organization [15].

In general, it can be said that AIS applications perform as an IS between different areas in a consistent and integrated process through a harmonized and correlated group of material and human resources in the business organization. AIS applications are also used for the preparation of accounting and financial information and communication this to senior management for planning and control purposes regarding activities and competition. AIS applications provide a framework by which resources (Financial, Material and Human) are coordinated to convert inputs (data) into outputs (information) (Figure 1.2), to assist a business to achieve its goals. Thus, it has become obvious that IS can be of benefit to operations and activities, and assist organizations to meet their objectives of survival, growth and profitability.

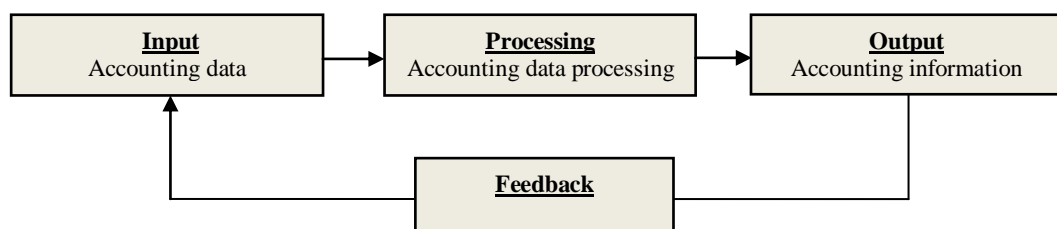


Figure 1.2: Accounting data processing cycle

Accounting data processing in AIS is conducted in order to extract suitable and useful information for stakeholders who require such information. This procedure is conducted by processing accounting data in four phases (Figure 1.2): entering the accounting data, saving it, and processing the output of accounting information, then obtaining feedback for this process. The above process reveals whether the AIS works efficiently, which will be discussed in the next section.

### **1.3 Efficient performance of good AIS**

The efficiency of AIS is achieved by good preparation of the data flow track through the various sub-systems that constitute a business organization's functions and activities, in addition to using the proper documents and data collection and processing procedures. System efficiency means using inputs to produce outputs giving the expected results, consequently meaning that the system is working properly, and will produce the desired outcome of improving results. The difference between effectiveness and efficiency is that effectiveness is a measure of output quality, while efficiency is a measure of the quantity of materials and resources that are required to achieve the expected outputs. Effectiveness is achieved if there is efficiency, provided that the following are in place: required capacities, precise business organization, encouraging incentives and an effective control system [16, 17]. Thus, a system's effectiveness depends a great deal on the attributes of the user and his/her ability to handle the system, which is a result of several combined variables relating to effects and impressions in addition to the user's qualifications and experience. There are environmental factors related to the degree of work complexity and its relationship with the surrounding environment, in addition to organizational factors represented in the degree of assistance provided to IS by management, and its ability to solve problems resulting from using this system [18].

The researcher argues that the efficiency of good AIS is achieved in business organizations when its concern is not limited to accounting aspects, but rather, extends to providing quantitative, financial and economic data required by stakeholders of various business organizations. The success of AIS strategic performance is discussed in the next section.

## **1.4 Success of strategic AIS performance**

AIS performance can be considered successful if it changes a business organization's competitive methods, and if it improves competitiveness in relation to other business organizations in the same sector [19]. Roslender [20] described this system as a business environment surrounded by a group of elements interactive with each other and its environment, in order to support the competitive strategy of the business organization and support its plan to establish a competitive progress or shrink the competitive gap where there is a marked difference between the performance of a business organization and that of its competitors. Laudon [21] and DeVoe [22] argue that AIS is able to change objectives, operations, products, services, or the environmental relationships to enable the business organization to gain a competitive progress, it is also a special system that aims to support and sustain the competitiveness of business organizations. In this context, the researcher argues that the strategic AIS is a group of elements or components that is designed and implemented to support modes of business organizations' activities. It is distinguished from other ISs in its ability to utilize the available resources in the business organization to enable it to achieve a competitive advantage, maintain the already achieved one, or minimize the competitive gap between the business organization and its competitors. As the researcher mentioned earlier, the strategic AIS is an IS that enables an organization to achieve a competitive advantage, where the concept of the competitive advantage is, to a great extent, one of the flexible concepts. It means maximizing a business organization's market share, increasing its sales by a specific percentage, gaining new customers, or maximizing current customers' loyalty, or acquiring new customers. Making these changes is one of the business organization's strategic management tasks (Chapter 4), and the business organization needs strategic information in order to support the decision-making process mostly related to future and unexpected problems. Because the concept of strategic IS is relatively new, few comprehensive studies have been conducted, since most of them believe that the strategic AIS is a system designed and built to be a strategic one. The strategic IS can be any IS established in a business organization, such as a decision support system or even a simple data processing system. The system is initially built and implemented as a normal IS but can evolve over time and continue to develop until it becomes strategic. It is important to know that the majority of ISs do not become strategic during their life cycle. The strategic IS does not achieve competitive improvement by itself, but has the capacity to make efficient use of a number of the resources of a business organization in order to achieve a better competitive edge. Moreover, in order to improve competitiveness, the IS needs to be complemented by

astute management strategies, where management is fully aware of the basic operations of the business organization. The system itself does not produce competitive improvement and on its own, it makes no difference; what is important is the method used by the business organization to develop the IS. The strategic IS has three important distinguishing characteristics:

1. A wide external vision.
2. Supportive innovation.
3. Changes a business organization's method of competing with other business organizations.

Strategic researches and studies indicate that there are three types of activities (Figure 1.3) that the strategic IS can provide for the direction of a business organization [23]:

1. building strategic information resources;
2. supporting innovation in the business organization; and
3. developing and improving operational efficiency.

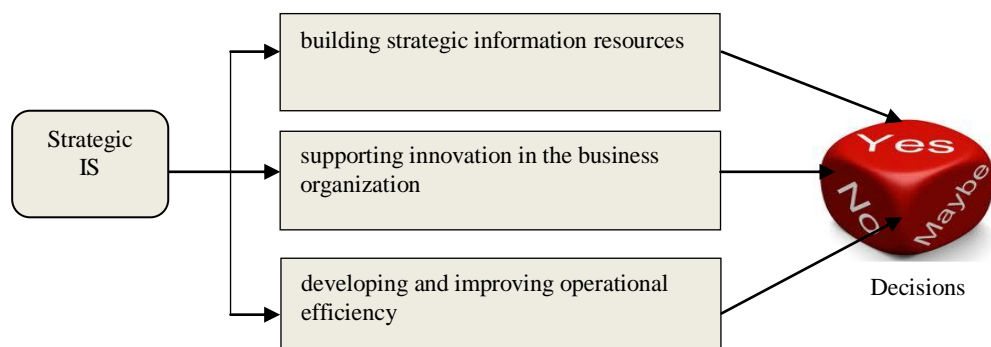


Figure 1.3: IS strategic activities in business organizations

All of the above activities are highly significant for most business organizations, since any or all of their business type can achieve the required competitive improvement. A business organization's effectiveness can be measured from both internal and external perspectives. From the internal perspective, effectiveness is measured in terms of achieving the objectives such as the volume of sales, market share, and profits, etc. While effectiveness in the external environment is measured on the basis of a business organization's competitive capacity based on the customer's level of acceptance of its products or services, the degree

of realizing technological development and innovation, its sensitivity towards economic fluctuations and its capacity to react [24]. In the next section, the researcher will discuss AIS activities in banks.

## **1.5 AIS in banks**

Banking activity is one of the most significant activities in the economic system of any society, where all things economic begin and end. Society's outputs of economic transactions are determined as much as the banks' contribution in their capacity to act in these transactions, which results in their wealth, validity and accurate forecasting. A bank cannot undertake this mission and perform this role unless a database of information is available. This cannot be provided without having a valid AIS in the bank. There is an urgent need for banks to adopt and use these systems in their business dealings as they provide speed, accuracy and efficiency for accounting practices by providing relevant accounting information at the highest possible speed at the lowest possible cost.

The various applied systems in business organizations, especially the service providers such as banks, are affected by their surrounding environmental variables, on the one hand, and the accounting practices and their development, on the other hand. Banking activity is highly responsive and sensitive to all variables, inputs and incidents related to the banking environment, at local and international levels; this necessitates having an integrated information department to rely on to provide at least security, trust and objectivity for all parties concerned [25]. In order to perform its role adequately, the components of AIS should be arranged and coordinated. Therefore, it is necessary to have a framework through which the KPIs related to AIS performance are determined in order to verify their levels. Based on the above, the researcher will conduct an in-depth discussion of this issue in the following sections.

## **1.6 The significance of AIS banks**

Accounting in a commercial bank represents one of the most important pillars in the business organization and operation of the bank, if not the most important of all, since it provides a

basic foundation of information for planning, surveillance, monitoring and evaluating performance and decision-making. Banking activity is sensitive to all variables and events that take place in both the internal and external bank's work environment at the local and global level. Therefore banks need an integrated information department that can be relied upon to provide a minimum level of security, trust, objectivity, and assurance for all relevant parties. The significance is attributed to the specificity and sensitivity of the banking activities and uniqueness of a range of features, mainly [26]:

1. A quicker decision-making process;
2. The inclusion of several activities to be performed with a high degree of skill and professionalism;
3. Since money is the focus of banking activity, there is the need for a high level of performance monitoring in all departments of a bank;
4. Because money belongs mainly to depositors, not to the bank, good planning and adequate discipline is required when making decisions regarding the receipt and investment of funds;
5. Banking activity is characterized by a high degree of sensitivity to economic conditions, and is vulnerable to economic turmoil and rumors and there must be a way to accommodate and absorb these effects;
6. Banking activities have a great impact as a result of the breadth and overlap of bank practices in all economic activities practiced by the community through credit facilities and other banking services.

In the next section, the researcher discusses the issue of AIS in developing countries.

## **1.7 AIS in developing countries**

The environment of the new world order affects the AIS performance in developing countries, including Jordan, in many respects, including: its objectives, strategies, nature of its work and instruments that achieve its objectives. Hence, the traditional AIS needs to be reviewed since it requires new instruments to determine, measure and present accounting information in order to adapt to the requirements of modern technology and competition factors. This has become one of the features of the new world order. The second financial

development report of World Economic Forum of 2009 [27], which covered 55 different world financial systems, discussed this issue. The report also included analyses of these systems and of the developed and developing countries' motives for development, in order to have a reference for the decision maker in the countries concerned for their economic reform priorities. The report provides a chance for the executive managers to deal together with their counterparts in academia, experts and decision-makers to face the issues raised in the agenda of the World Economic Forum. The report revealed the negative effects of financial instability in the financial systems, especially the commercial banks in the developing countries. It was considered as an indicator of a defect in the components of those systems, which negatively affected their function. Some specialized research emphasized that banks and finance institutions play a significant role in economic growth, more effectively and efficiently than the current systems in the market, especially in the developing countries, since financial banking services are less developed.

The researcher argues that AIS should be an instrument used by business organizations to assess their financial position, performance, cash and non-cash expenditures. Also, AIS is the technical instrument that can be used to communicate the accounting information regarding financial reports, which should be adequate and prepared properly with sufficient credibility and reliability to be used in adequate decision making. It is argued that the accounting system in the developing countries tends to be an IS that does not limit itself to data and financial information; rather, it also includes quantitative and descriptive data and information of benefit to stakeholders. Consequently, AIS provides information in addition to the financial information, but although it still requires improvement. In the next section, the researcher will elaborate on the effect of competition in Jordanian banks.

## **1.8 The effect of global competition on banks' performance in Jordan**

The intense competition and what accompanied it as a result of the extensive use of IT played a major role in trade liberalization of financial services. It also played a role in freeing market dealing in financial services and banking, thereby producing a harsh competitive environment. This does not, in particular, rely on quality and price as a basis for differentiation. Competition gave rise to inclusiveness, adding a new dimension to the business organization's activities and changing the orientation towards a solid



foundation of excellence and development. This was especially noted in the acquisition of advanced cognitive skills and capacities, the stimulation of productivity and the increased level of performance. Additionally, it produced a distinctive behaviour with regard to transactions in the financial sector, since the significant economic and financial issue for developed countries is marketing, i.e. expand markets through the service industry in general and banks in particular. Moreover, the export industry was stimulated, finding a way to utilize the potential added-value of other countries, especially developing countries. This was done through the transition of investment within such countries' markets. This caused new factors to come into play, positively affecting banking services' activities and marketing by establishing relations with customers. However, it is easy for all this to collapse in light of new realities, if not accompanied by development, growth and diversity of services, in order to meet the diverse needs of customers. Furthermore, banks need to use new and developed systems which require innovative approaches and larger capacities and potentials in order to manage banking activities efficiently.

Global competition has created an environment where users are required to use cutting edge technologies to handle information, operational activities and output; such an environment necessitates a change of attitude and orientation towards innovation, modernization, customer care and knowledge. By adopting appropriate strategies, banks aim to survive and maintain or improve their market share and competitiveness. This means that the provision of traditional banking services needs to change so that services can actively provide full, comprehensive banking services. All these requirements and transition processes will affect the essential work of banks in the following ways:

**First:** Local banks have to move away from working cost in addition to profit margin that had prevailed prior to the comprehensive competition.

**Second:** Higher costs are incurred because these changes require changes in activities and services.

This requires, at the same time, a change in the method of measuring and assessing the efficiency and performance of banks and its reliance on financial and accounting perspectives. In addition to the non-financial (operational) measures, other perspectives concerning all bank activities must be taken into account. This means that a bank should endeavour to find a new system for assessing performance which combines financial and non-financial measures. Also, for displaying a consolidated version to reveal the possibility of achieving the goals and plans, interim and long-term strategy, as well as drawing a

coherent picture for evaluating the performance of the bank in a comprehensive manner as well as all the activities and trends. This enables administrative departments to evaluate all departments and individuals working in the bank, thus determining the extent to which their efforts and activities serve the objectives of the bank. At the same time, this process motivates staff and encourages them to continually develop and improve their productivity and performance. It is therefore pertinent to now discuss the factors affecting AIS performance.

## **1.9 Factors affecting AIS performance**

Many researchers emphasized discussing the major KPIs factors that affect AIS performance, in order to urge business organizations to focus on those factors to improve and develop AIS to become of high performance fulfilling its purpose, which positively affects business organizations' performance. This is rationalized in the following needs:

- a. The accounting system is closely related to various management processes. This contributes to rationalizing decisions and makes the management process more effective in fulfilling business organization's management requirements and promoting performance level to achieving the objectives. Hence, the significance of an effective AIS presence arises to rationalize management decisions in business organizations and assist management to solve their problems, in addition providing useful information for concerned decision makers, having a positive role in supporting the continuity of such business organizations [28, 29].

There is a need for accountants to recognize that an AIS can be used to formulate more comprehensive and effective strategies, achieved by balancing the quantitative and non-quantitative aspects of performance. Since business organizations require a measurement system that balances the historical precision and integration of financial figures with the current KPIs, an AIS would enable a business organization to reap the benefits and advantages of the strategy. Furthermore, in order to achieve competitive advantage, it is necessary to have a strategic leadership vision that uses modern management methods.

- b. This issue necessitated the emergence of the Total System, i.e., the IS consists of several sub-systems, which are intended to provide management with the required information in order for various decisions to be made. Since it became difficult for

banks to rely on one system as they had previously, the AIS became a significant and basic source of the business, in addition to other sources such as human resources, equipment, etc. since a banks' productivity is directly and positively affected by the implementation of an effective IS [7]. Several well-known scientific assemblies and societies explained the role of accounting as an IS, with the American Accounting Association urging further accounting research to develop accounting systems that include methods that will facilitate the objectives of management. They considered that scientific research in ISs falls exactly within the framework of accounting research, and accounting as an IS that handles the same problems of management comprehensive IS. Information has become the most significant asset in the last decades, since IT development has resulted in the increase of information volume that needs to be processed and presented in massive volumes, which subsequently complicate control operations. IT applications have become widespread in all fields and at all levels. The above reveals that the role of accounting in an economic unit is not limited to accounting measurement in the economic unit in general, but rather, should be extended to include financial and non-financial analysis of these transactions, and provide the required information to relevant personnel in order to assist them with the decision-making process and to serve the objectives of the economic unit in general.

In considering the above, the researcher noted that there is a significant need for a comprehensive framework comprised of a set of components, either human or material, which includes components and procedures that act together in a correlated and integrated method when applying AIS functions. This includes data operations and the retrieval of results that are provided to relevant personnel to facilitate timely and appropriate decision-making and effective strategies. This will be discussed in more depth later. Thus, it is necessary to improve AIS performance and point out its significance. In this thesis, the researcher will look into the factors affecting the performance of AIS systems and improve it, as discussed further in the next section.

### **1.10 The need to improve banks' AIS performance in Jordan**

Banks in the Middle East in general and Jordan in particular, are interested in seeking out and taking advantage of the real opportunities presented by widespread economic and social

transformations. Such opportunities are afforded by the framework of AIS inherited powers, and in light of the development and rise in the level of productivity to create better economic growth. Banks are also interested in providing new careers and access to the building environment, openly and competitively, and to access higher levels of innovation. In particular, banks are directly based on IS and the private accounting sector, including work and activities; hence the importance of AIS in business practice of banks. Also, it can facilitate reliable sustained growth, appropriate decision-making, and control over the conduct of operations in expanding from local to global markets. To keep pace with the commercial developments in the developed countries in free trade, electronic and Internet trading, and to strongly compete with their counterparts, banks have to restructure the way by which they evaluate their systems' performance. Also, they need to include operational measures in addition to financial measures that are currently in place. This can be done through the development of a set of areas related to AIS and technologies to meet, at the same time, the operational measures established by a comprehensive performance evaluation. In the next section, the researcher discusses the three strategic factors leading to business improvement that underlie his proposed framework.

### **1.11 The effects of competition on banks' AIS performance in Jordan**

Another element fuelling business competition is the revolution in modern IS and the evolution of media and communications. The current era is the era of expansion with regard to the use of IT and its multitude of applications, especially in the accounting field in different economic sectors, including banks. These expansions are leading to a change in the provision of banking services and activities which have induced banks to be more competitive in the provision of better service quality and speed ... etc. This means that in order for a bank to be competitive in the market, it must be receptive to new ideas for products and services that are responsive to the wishes of customers, the expansion of personal relationships with them, selection of suitable sites for them, responding to their needs as well as improving the skills of staff. Also, the development of methods of evaluation of work and activities, in addition to the expansion of knowledge technologies for IS, is a huge factor. Most of the banks and financial institutions provide programs, systems and new applications which make the most use of IT. This has resulted in an escalation in the number and quality of services provided to the public in ways that attract customers and

facilitate communication with them. We can determine the results that will be reflected in the banking sector and the financial effect of the expansion of IT in all its branches in the following:

- The recognition of the existence of a gap in IT in the field of banking and finance between developed countries and developing ones, especially countries in the Middle East. This is reflected in the rising cost of services provided to customers and clients.
- Working according to the IS approach has made it difficult to establish any restrictions, barriers or protection measures of any kind. This was a factor in a closed competition between the local banks, which affects the profit margin achieved by the banks before IS.
- A high cost will be incurred by local banks because of the dynamic and sophisticated nature of technologies used to provide services, development and diversity, and because an environment needs to be established within which the IT capabilities can be realized.

### **1.12 The effects of Internal Control on banks' AIS performance in Jordan**

For the banks to keep pace with the commercial developments in the developed countries in this area, area of free trade, the electronic and Internet trading, and for them to compete with their counterparts strongly, they need to restructure the methods used to evaluate the performance of their systems to include operational measures in addition to financial measures that are currently in place. This can be done through the development of a set of areas related to AIS and technologies to meet at the same time the operational measures established by a comprehensive performance evaluation. In the last two decades of the 20th century, the banks in Jordan faced problems which critically affected Petra Bank and the Bank of Credit and Commerce. The two issues facing both banks were the lack of accurate and efficient internal control systems, and the subsequent inaccuracy of the information output of these systems. The problems faced by the Petra Bank and the Bank of Credit and Commerce attracted widespread interest in Jordan[30].

The function of AIS in internal control is a most important and most critical task in a bank, as it is what guarantees the safety of its assets and the success of its financial position. Given the importance and seriousness of this function, the role of control systems' personnel does not only consist of surveillance of systems, but they also have a duty to continuously keep up to date with, pursue and study market, business and economic conditions. They also have the task of monitoring clients on an ongoing basis in order to reach a more accurate assessment of the situation of clients and bank [31]. This should all be done to avoid risks before consequences occur or at least reduce the risks as much as possible. In order to have well-functioning internal control systems, a well-functioning internal system is essential. This requires identifying control procedures which should be present in AIS. It also requires that new staff is given the qualifications and experience that enable them to use these systems. Therefore, the internal auditor must understand the nature of the business in order to work with electronic systems [32].

### **1.13 The effects of delivering AIS to Stakeholder on banks' AIS performance**

From this perspective, the study points out that the problem lies in how to fully exploit possibilities offered by the AIS. Previous studies indicate that in the practices of various levels of management in a wide range of businesses and jobs, as there is a weakness in the output of AIS with respect to their usefulness to the decision-makers in banks and other relevant personnel who may need this information. In the design or development of AIS, the nature of the relationship between this development and the decision-making process should be taken into account, because accounting information systems help decision makers to make use of the most significant information.

### **1.14 Strategies and significance of improvement of AIS**

In view of the foregoing observations, bank administration needs to focus its attention on finding alternatives to sharpen its competitive edge, and these alternatives focus on improving the performance of AIS in terms of three strategies (Figure 1.4):

1. Achieving and sustaining competitive advantage.
2. Providing features that can provide comprehensive information to different stakeholders.
3. Increasing the role of AIS in improving the efficiency of internal control systems.

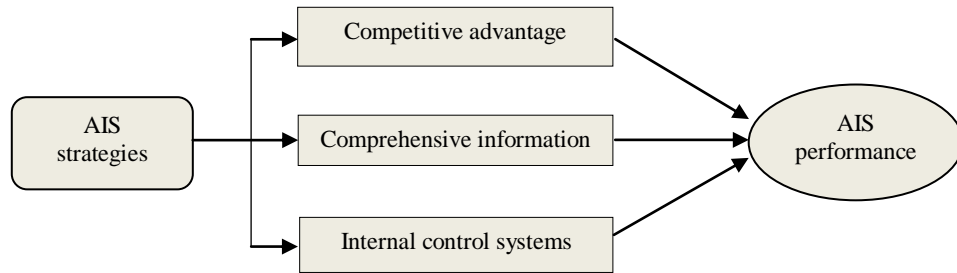


Figure 1.4: AIS performance improvement strategies for commercial banks

If these strategies are to be achieved, banks will have to evolve and improve productivity according to their specific needs. The purpose of this study is to highlight the importance of using new tools to measure the efficiency of performance taking into account new elements constituting the activities of banking. This means using both financial and non-financial accounting measurements in the evaluation process. This requires finding a new system to measure the performance combining financial evaluation on the basis of standard financial accounting and evaluation based on other performance standards; thus, the concept shifts to one that encompasses overall performance of all banking activities. Such a system would allow banks to provide banking, financial advice, investment and other non-banking services to clients. These services aim to satisfy the customer and to help the client select the best investment opportunities. This also encourages Jordanian banks to continue to develop and improve their banking services in collaboration with other sectors in order to retain existing customers or reach potential customers from the competitive market abroad. These added new benefits will increase the efficiency, productivity and performance of bank employees, and ensure customer satisfaction. This study explores the full potential of AIS to reduce costs and redraw production plans in line with the era of openness and IT development.

## **1.15 Study goal and objectives**

The goal of this study is to improve the performance of AIS in commercial banks in Jordan, by using KPIs and analysing the relationships between them to achieve the AIS goal by using the BSC (balanced scorecard) approach. This will be achieved through the following objectives:

1. Identifying the various key performance indicators (KPIs) that affect the AIS performance of commercial banks in Jordan.
2. Using BSC to classify the KPIs that have been identified in the first objective, according to the perspectives and goals.
3. Identifying the sub-indicators of the KPIs for the various perspectives of BSC that have been identified in the second objective.
4. Studying and analysing the relationships and links among all KPIs and sub-KPIs. This is done by using BSC and identifying impact on AIS systems implemented in the commercial banks in Jordan.
5. Developing strategies to improve the performance of AIS in the commercial banks in Jordan. This is based on the results obtained from the previous objective.
6. Establishing a logical framework of the comprehensive relationships, among the KPIs and sub-KPIs on one hand, and the KPIs and strategic objectives, on the other hand and also to improve the performance of AIS of commercial banks in Jordan. It is also intended to assess the KPIs according to their importance in achieving the strategic objectives.
7. Validating the proposed BSC model to test the KPIs which will lead to improving the AIS performance in commercial banks in Jordan.

## **1.16 Scope of the study**

The researcher believes that the different environmental and organizational circumstances and the variation in the levels of applying modern AIS systems and methods in the previous studies, and the multitude and diversity of KPIs evident in these studies, could affect, in one way or another, the conclusions. Consequently, this could produce variations in results and



conclusions, especially in terms of the BSC application. The scope of this study is as follows:

- a. This study proposes a mechanism to improve the performance of AIS in commercial banks which were selected as the subject of this the study.
- b. This study does not address the problems and obstacles that hinder the performance of AIS in commercial banks; it was exclusively concerned with the development of indicators relating to the perspectives of the BSC, which was restricted by this dissertation, which would achieve its goal without addressing the reality of the case for AIS in commercial banks, which has already been explored by previous studies in this field.
- c. This study was limited to commercial banks in Jordan and did not include government-owned Islamic, agricultural, industrial banks... etc. This was done in order to scientifically present the results of the study of commonly-used AIS in those banks to some extent and the different levels of AIS application in the banking sector. The study included all branches of commercial banks in the Kingdom of Jordan.
- d. Factors of the study were measured from the perspective of AIS system users as they operate within this system, as well as from the perspective of associates and regulators of those systems and the point of view of users' information represented by senior management and other departments of commercial banks in Jordan.
- e. This study does not examine the financial or operational performance; hence, it does not use the financial data extracted from published financial statements, and does not compare financial with operations performance. This is because this study is not concerned with evaluating performance by the traditional means of 'financial analyses'.

### **1.17 Restrictions of the study**

The researcher faced several difficulties when distributing the questionnaire, namely:

1. Precise statistical data about the various functions of the commercial banks in Jordan, number of employees, and in particular, the designers and users of AIS, were unavailable.

2. Various branches of the commercial banks in different locations in Jordan were separated by long distances.
3. Some of the respondents' unawareness of the BSC (tool of the study) system meant that they were unable to understand some questions; consequently, some questions were not answered.
4. Some respondents showed little interest in responding to some of the questions in the questionnaire.
5. The management of some branches did not co-operate with the researcher, claiming that their work commitments prevented them from taking part in the research.

### **1.18 Significance of the study**

The significance of this study can be seen from both the scientific and professional perspectives, in that it is an attempt to establish the scientific basis of AIS, which is still a subject of debate and research in accounting and IT literatures. This study is valuable because the BSC basis, as one of the modern frameworks, has proved its efficiency in the development of AIS professional performance. The significance of this study also pertains to the discussed issues, which are summarized as follows:

1. This study emphasizes the significance of the commercial banks' role in supporting the Jordanian economy and boosting its development, which requires consideration of AIS, to increase its capacity and effectiveness to provide information for the banking business. It is the starting point of any target development for such systems.
2. This study conducts the necessary analysis before suggesting any amendments to the current systems or designing any of the AIS systems. Also, there is a great need for the results of such studies and researches to design effective AIS systems that enable the management of the business organization to efficiently and effectively make decisions and perform activities, since the IS represents the memory and reasoning aspect of any business organization.
3. This study serves the commercial banks in Jordan by providing results and recommendations which can be used as a foundation upon which banks can develop their systems and achieve their goals.

4. The study attempts to identify the difficulties and problems that currently prevent coordination between the requirements of improving information systems (IS). This will help find significant solutions to help overcome difficulties, in order to narrow the gap between the banks' strategies and systems technology for the purpose of assessing performance.
5. The research attracts the attention of bank departments that need to keep up with contemporary technological regulations. This points to the need to change indicators and conventional measures used in evaluating performance; this will ultimately improve performance which in turn ensures continuity and competition. It also aims to convince banks of the significance of operational measures in using a balanced scorecard assessment system of overall performance.
6. This study shows the significance of evaluating performance by using the balanced scorecard performance assessment to produce an accurate appraisal of the actual performance of information technology in banks, which provides useful information prior to making strategic decisions and operational governance.
7. The study reveals the relationship between the validity and reliability of AIS used by commercial banks in Jordan, thereby showing the importance of keeping pace with the requirements of technology development.
8. Commercial banks can evaluate their AIS performance by utilizing the performance improvement indicators proposed in this study to improve the banking services that they provide.
9. To achieve the expected goals of the internal control systems in protecting monies and upgrade performance efficiency in order to achieve bank's strategic plans, AISs that achieve such goals should be prepared, taking into consideration the relative differentiation between obtaining and developing these systems and their expected benefit.
10. This study is a starting point for other studies in the Jordanian environment supporting the novelty of this issue in accounting and IS literature in the Middle East in general and specifically in Jordan. It relates to the conscious effort by commercial banks in Jordan to improve and develop AIS in order to become more competitive. The possible BSC-perspectives to be adopted were used to select the KPIs that support AIS in competence and its application in Jordanian commercial banks.

## 1.19 Plan of the study

As mentioned earlier, this study intends to develop a methodology in order to improve AIS performance for commercial banks in Jordan.

In order to achieve these objectives, the following study structure has been adopted:

**Chapter 2:** In Chapter 2, a literature review is conducted which examines the AIS concept, its nature, characteristics, types, classifications, functions and its relationship with other systems. This chapter also discusses the concept of commercial banks, significance, types, functions, and the main characteristics of AIS in such banks, attributes and constituents of AIS in the commercial banks in Jordan. This chapter will also discuss the effectiveness and efficiency of AIS, their concepts and the differences between them, and the characteristics and features of IS effectiveness.

**Chapter 3:** In Chapter 3, performance as a concept, performance management, key performance elements, and performance assessment, are discussed. Also, this chapter discusses the significance of measuring performance, the objectives of performance assessment and assessment steps. The various methods of performance measurement include the traditional financial and non-financial performance standards. In this chapter, the trends of performance standards of development are discussed.

**Chapter 4:** In Chapter 4, strategy methods and the BSC are presented. The general content of the strategy includes the concept and dimensions in terms of its importance, comprehensiveness, long-term outlook, the nature of the strategy, characteristics of strategic decisions, levels of strategy, strategic plan for banks, building the bank's strategy and the strategic plan to the banks of Jordan. This chapter also examines BSC from the perspective of its development, its concept and significance, BSC factors, and factors relevant to measuring performance according to BSC methodology. Also, this chapter discusses the balance in the BSC, the basic roles of BSC and the dimensions of the BSC perspectives. Furthermore, this chapter discusses how AIS can be used together with the BSC to comprehensively measure performance for the purposes of strategic planning.

**Chapter 5:** Chapter 5 explores BSC achievements and the sustaining of competitive advantage in business organizations and banks, the features that give comprehensive information to different stakeholders in business organizations and banks, the increasingly important role that AIS plays in improving the efficiency of internal control systems in business organizations and banks. It also considers the conclusions drawn by previous studies regarding AIS outcomes in terms of performance evaluation and measurement,

modern approaches to measuring and evaluating performance in the contemporary business environment, and the BSC module concept adapted by contemporary business organizations. This chapter will also point out the features of this study which make it unique and differentiate it from other studies.

**Chapter 6:** Chapter 6 provides the problem definition and solution overview of KPIs basic classification affecting the AIS performance in the commercial banks in Jordan, reflections of KPIs impact on AIS performance, and the problem of the study. Under KPIs basic classification, a discussion is presented of the environmental, organizational, behavioural and technical KPIs.

**Chapter 7:** In Chapter 7, the research framework and methodology are described. This includes the study objective and study framework, the BSC approach, the methodology used in the analysis process, and a description of how to build a BSC pyramid analysis and methodology of the questionnaire.

**Chapter 8:** In Chapter 8, the researcher will discuss the data analysis mechanism, the AHP analysis review, the review survey analysis, descriptive statistics, analysis of data related to KPIs of BSC-perspectives, correlation coefficient analysis, credibility of questionnaire, final conclusions outcomes and observation of sequencing methodology.

**Chapter 9:** Chapter 9 presents a final calculation discussion, BSC perspectives and recommendations.

**Chapter 10:** In Chapter 10, the main points of this study are recapitulated and the direction of future studies is discussed.

## **1.20 Conclusion**

With the spread of information in the new era, economic development and expansion of its fields and the emergence of world markets, the need for an IS accounting system has been acknowledged. AIS has become one of the most significant ISs in modern business organizations. AIS consists of several sub-systems that work together in a coherent, consistent and mutual way to provide the historical, current and future financial and non-financial information to all relevant stakeholders so that the business organization can fulfill its strategies and goals. Since banks are the largest sector to use developed IT, especially financial IT, it is essential that they develop accounting researches, to include methods of developing IS to fulfill managements' requirements, since accounting is an IS for dealing

with the same problems as the comprehensive IS for management. Moreover, IS can be used for the purposes of receiving, recording, saving, retrieving, operating, transferring and presenting data, which can then be used to gain a competitive edge in the market and provide accurate and credible information for stakeholders, in addition to ensuring internal operations control.

In Jordan, AIS has become a new resource that gave commercial banks the capacity to improve their efficiency and effectiveness, hence their performance. Thus, those banks should establish policies and strategies to develop their AIS resources and encourage the utilization and further development of AIS, consistent with the current developments, in order to achieve a more effective growth in banking services. This study argues that it is appropriate to adopt BSC for improving AIS performance at the commercial banks in Jordan and build comprehensive strategies for them. This will be discussed in detail in the next chapters.

# **Chapter 2 - Accounting Information Systems (AIS) in Commercial Banks**

## **2.1 Introduction**

This chapter provides a discussion of the role of the Accounting Information System (AIS) in the revolutionary era of information and points out its importance to accounting as an IS in banks. Furthermore, the researcher describes the qualitative characteristics of AIS and discusses accounting as an IS. The researcher points out IS significance and classification according to its degree of certainty and accuracy of outputs, official availability in terms of the integration of its sub-systems. The AIS relationship with MIS and the functions of AISs in commercial banks are also discussed together with a definition of commercial bank and the importance of commercial banks to the national economy. The researcher discusses the functions of commercial banks, the concept of AIS and its most important characteristics and the advantages that it brings to the commercial bank. The AIS in commercial banks is discussed in terms of its objectives and data processing, the IS environment, the availability of an effective communication network, the components of AIS and the availability of effective internal controls. This chapter also defines the concept of effectiveness as it applies to AIS, and discusses the differences between system effectiveness, system efficiency and performance of the system. Methods of measuring AIS effectiveness and properties and specifications of the effective AIS are also discussed. Finally, this chapter concludes with a conclusion.

## **2.2 AIS in the information revolution era**

This era of information and knowledge revolution, has resulted in the world becoming a small global village. Consequently, with the emergence of an information and knowledge society, and keys of civilization and potentials of strength have shifted from material to information and from machines to knowledge [33, 34]. The world now is witnessing a

revolution in information, expanding and proliferating easily by the vast progress made in communications and IT. The present era is the information era [35]. Information in today's world is as important as physical and human resources in business, building business organizations, maintaining available resources. Therefore, providing information as and when required for business processing is one of the vital fields receiving great attention as never before [36].

On the other hand, this revolution brings changes to many of a business organisation's functions. For example, the accountant now operates in an exciting, complex and constantly changing environment, since the economic and legal environment of the accountant is changing in unexpected ways. Furthermore, the rate of progress in IT is increasing in an unprecedented way. Businesses are changing their management and business structure in order to remain viable in an increasingly competitive environment [37]. Accounting concepts are attracting increasing recognition and attention due to the impact of environmental variables on accounting systems, practices and their development in various countries and business organisations. These changes in accounting concepts have propelled the development of accounting systems in business organisations.

### **2.3 Evolution and importance of accounting as an Information System**

Methods of gathering and recording data and information have continued throughout the ages. Accounting is an organized profession that specializes in recording, tabulating and summarizing the economic incidents in order to benefit various parties related to the business organisation. Its concept has gradually evolved until it became known as the process of identifying, measuring and communicating information to enable its users to form an informed opinion and make decisions. Therefore, AIS in business organisations is a major development which supplies management and related parties with accurate and relevant information, and seeks to achieve many goals. The effectiveness of this system is judged by its success in achieving those goals. Effective AIS is capable of providing management with the necessary timely information to make various decisions. Over the years, the AIS has evolved into an integrated Information System (IS); therefore, its effectiveness is measured by the extent to which it provides useful information, which helps in rational decision-making [38]. In the next section, the researcher discusses the characteristics of AIS.



### 2.3.1 Qualitative characteristics of accounting information

In order to provide useful accounting information to its users, certain qualitative standards need to be met by the AIS. These standards allow the system to be judged in terms of the extent to which it contributes to achieving the desired objectives. This has been addressed by many who have been concerned with the quality of the output of the AIS. As highlighted by Ulric [39] those qualitative characteristics are organized hierarchically (Figure 2.1) as follows:

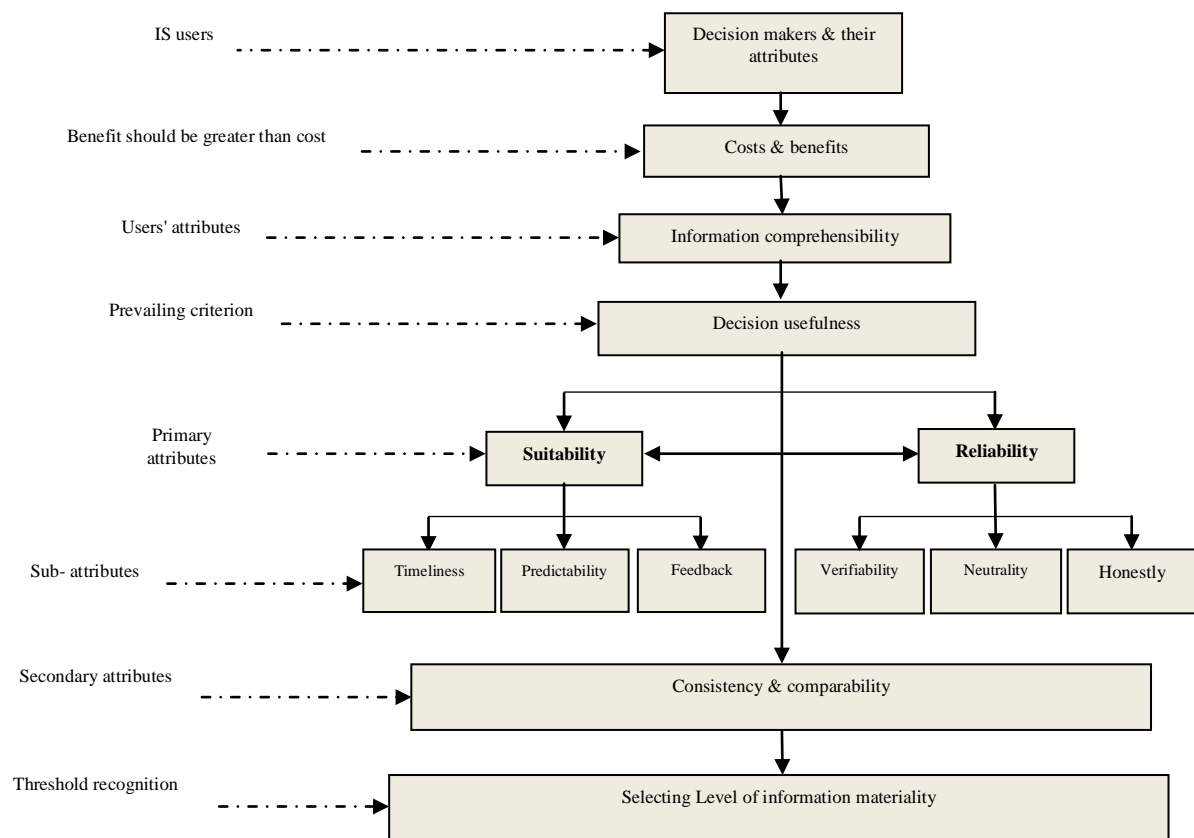


Figure 2.1: Qualitative characteristics of accounting information [39].

#### 2.3.1.1 Decision usefulness

Usefulness of the accounting information is achieved by reducing uncertainties for the decision-maker, and increasing the degree of his knowledge. Therefore, an important characteristic of AIS is that, depending on the decision maker, the type of decision to be made, and the method of making the decision, the given information should be

understandable to the decision maker in order to make use of it. This means that information should be understood directly by users, assuming that the user has a reasonable level of knowledge of financial and economic activities [40, 41]. It also depends on qualitative and timely experience in dealing with information, since it is unreasonable that it be used by someone who does not understand what the information means, which may result in making an incorrect judgment [34].

In this study, the researcher considers that accounting information should be submitted to recipients in an acceptable form and substance. In terms of format, it should be in the form of a simple language, clear and understandable written report, or in the form of statistics or charts. But in terms of content, it should be relatively short, without losing its meaning or semantics and should not be overly detailed, which could quickly lead to user fatigue and inability to concentrate on the required information. In the next sub-section, the researcher discusses the primary attributes required for making the information decision useful.

### **2.3.1.2 Primary attributes for decision usefulness**

Two primary attributes, convenience and reliability, will be discussed as follows:

#### **2.3.1.2.1 Convenience (Suitability)**

Information is appropriate when it affects the decision of users by helping them to assess the events, and must be linked to the objective. Shipper [24], defines appropriate information as that which can change the behaviour of the decision maker, which leads him to make a decision different from what would have been made in the absence of such information. Qassem [42] defines appropriateness as the ability of information to change the perception of the decision maker towards the subject of a particular decision, leading the user to make a decision that is more accurate and therefore more useful. Thus, the researcher believes that appropriate information is necessary to making a particular decision, since it contributes in to rational decision-making by providing the best available alternative for the decision maker. Appropriateness of accounting information is characterised by the following:

- **Timeliness:** Information not provided by the due date (obsolete) will have no value or effect on the behaviour of the decision maker, regardless of the degree of importance and vitality of the resolution. Therefore, it must be provided before

losing its ability to influence decision-making. So that the decision is made in a timely manner and is useful, it may be necessary to sacrifice some accuracy in calculations in the measurement process for the benefit of appropriate timing [43, 44].

- **Predictability:** Accounting information should enable the user to make the most of it in order to make decisions related to future forecasts.
- **Feedback value:** Accounting information must have the ability to monitor and evaluate through the correction of mistakes. This is important for the control unit, since it enables the comparison of results between actual and planned implementation, thereby allowing corrective actions to be taken [38].

#### 2.3.1.2.2 Reliability

Reliability is defined as the information's trustworthiness so that it can be relied upon by the decision-maker; information is reliable if it is verifiable, free from bias, and faithfully represents the designated expressed fact. This means that there is evidence to enhance the user's confidence in this information [45, 46]. Reliability of accounting information can be achieved through the following sub-characteristics:

- **Verifiability:** This means the ability to access the same results by more than one person or entity if the same methods and techniques are used measuring accounting information [47], which must be based on authenticity and objectivity, and is measurable.
- **Neutrality:** To be achieved in accordance with the adopted accounting standards, regardless of the outcome, the information should be offered to all without prejudice to a group. This leads to justice in submitting lists and reports to all recipients [45].
- **Honesty:** Information should be true and accurate and reflect the events in a sound and true manner free of any deliberate manipulation; otherwise it will be harmful and useless, even if it were appropriate, timely and understandable to its user [46]. Accuracy means matching information to the expressed reality without errors, while correctness implies data gathering, recording and processing correctly [48].

In the next sub-section, the researcher discusses the secondary attributes of information for decision usefulness.

### **2.3.1.3 Secondary attributes for decision usefulness**

The secondary attributes are consistency and comparability.

#### **2.3.1.3.1 Consistency**

Through the continuous use of the same methods, principles, techniques and policies adopted for the measurement and communication of financial information of one accounting period to another, when any change is necessary, it must be disclosed in order to be taken into consideration by the users of financial statements that result from financial operations in business organisations [39].

#### **2.3.1.3.2 Comparability**

Comparability is the ability to compare one financial period with another for the same business organisation or with other organisations for the same activity [49]. When the accounting methods and techniques are consistent, the accounting information is better able to be compared. It is also noted that there are two main constraints that determine the possibility of producing accounting information:

- **Feasibility:** The utilization of information must exceed its cost, because if it is worthless, there is no reason for producing it [31]. The value of accounting information is in the difference between its benefits, such as sound decisions made, with the required accuracy, timeliness, and the new system's cost designed to get that information. Therefore, if the cost effectiveness and quality of information are better, then the new IS is better than the old [50].
- **Materiality of the produced information:** This is concerned with the amount of accounting information that must be produced and disclosed, since the ability of that information to influence decision-making varies from one particular person to another [15]. In this regard, Jum'a [40] argues that a balance must be achieved between the effectiveness of making a decision and the amount of information that must be provided since an excessive amount of information would negatively affect the decision-making.

## 2.4 Accounting as an Information System (IS)

Accounting emerged as a result of the human need to exchange economic benefits with numerous transactions which made it difficult for the human to rely only on his memory. With the economic development, the need for accounting evolved, from a mere tool of bookkeeping based on professionalism, to that of an IS which brings together many of the accounting branches. This is based on a rich theoretical and practical background, and maintains relationships with many fields of sciences and knowledge, starting at economics, management and statistics. Figure 2.2 shows how the transaction is processed by the IS, and shows a simple AIS.

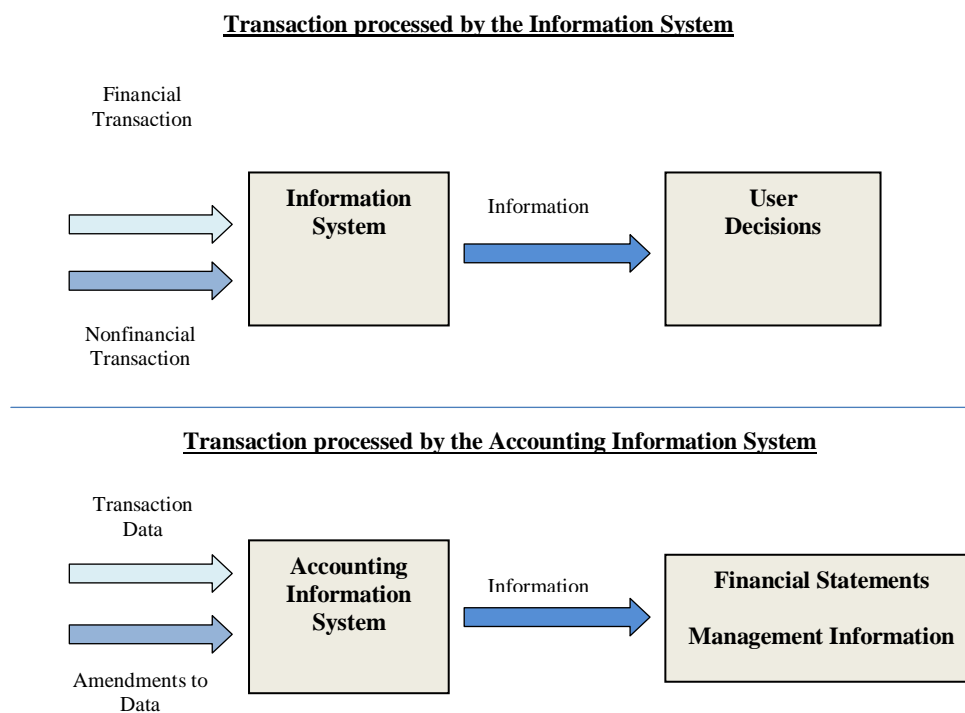


Figure 2.2: A simple accounting information system [51]

Accounting, as an IS, was one phase in accounting development, known as the ‘accounting management’ phase. This phase is considered as a response from the accountant in the 20th century to spread the concept of scientific management’s school. The school that advocated the significant slogan “what cannot be measured cannot be managed”, found that as long as the accounting function is to produce and disseminate information to stakeholders, it can be considered as a financial accounting system such as an IS [43].

Accounting was defined as “a set of integrated subsidiary IS that is concerned with measuring the impact of operations and financial activities and the delivery of the required information quantity, quality and timing. This aims to achieve the potential benefit of this information for users from inside or outside the business organisation” [52]. The American Accountant's Society has emphasized the necessity of developing accounting researches, considering that scientific research in IS is entirely within the framework of the accounting research. It viewed accounting as an IS of recording, storage, retrieval, operation, transfer and display to be used in rationalizing of decisions [53]. The role of accounting makes it a distinctive IS, since it represents an integrated network of accounting procedures, and is prepared in an integrated manner to achieve specific objectives. This is done by converting certain data to information and retrieving it manually or electronically for delivery to a broad base of decision-makers [7]. Thus, accounting, with its different branches has become an IS, playing an outstanding role through a series of coherent, sequential and integrated operations. Its features are described by [54]:

1. Limit the processes and represent them in the form of raw data, record them in the accounting books and records.
2. Operate and process the raw data in a range of generally accepted accounting principles, in order to be transformed into economic data for the recipients' use.
3. Deliver the processed information to the recipients in the form of financial statements and reports.

The next Section will provide more details about Information System and Accounting Information System.

## 2.5 Definition of IS & AIS

### 2.5.1 Definition of IS

In the literature, IS has been defined in many different ways. Some of these definitions are as follows:

- a. A system such as in the human elements and IT, operating in an integrated way in order to provide the business organisation with the necessary information to exercise its work and achieve its objectives [37].
- b. The IS is a group of staff, procedures and resources that collect and process data, transfer it into useful information, and deliver it to users in an appropriate and timely manner. The purpose of that is to assist them in performing the functions entrusted to them [55].
- c. A set of organized procedures, providing information to support control and decision-making, upon implementing them [56].
- d. A set of sub-systems that provide users with needed information enabling them to plan, direct and evaluate, coordinate and oversee their work efficiently and effectively. These systems require a group of people, procedures, databases, and circuits, devices, techniques, and programs that do the process of collecting, operating and storing information, and delivering them to the executive levels, which provide management with the necessary information for decision-making [57].
- e. A group of individuals, procedures and materials that collect, process and provide information in the business organisation [58].
- f. A set of elements and components (tangible and intangible), which operate in a balanced way to process data in order to build a specific structure or a specific means of communication (network). This is to help the flow of information to achieve the objectives in light of a certain environment, and to achieve a kind of censorship [36].

Thus, the researcher argues that the last definition is general and comprehensive for the IS, through which elements, bases or requirements of those systems can be derived. This is either in private parties, governmental, societies, charitable institutions or public business organisations, commercial or industrial businesses. It also applies to any IS, whether a simple manual system, consisting of a set of files and books, documents or a comprehensive and complex system based on using the computer.

## 2.5.2 Definition of AIS

Like IS, AIS too has been defined in different ways in the literature. Some of these definitions are as follows:

- The AIS is one of the components of a management business organisation concerned with the accumulating classification, processing, and analysis, and communicating appropriate financial information to decision-making by external parties and business organisation management [59].
- A specialized data collection system, with a set of procedures to process them in order to produce the required accounting information for its users [60].
- A set of sub-systems, specialized in processing financial transactions [51].
- A special subsystem of management systems that aims at gathering, processing and production of information related to business transactions of financial attributes in an integrated way and cannot be a separate subsystem [39].

Moreover, the modern view of AISs is that they are no longer limited to providing historical information only, but have been extended to include other types of information such as: the current data (operational and operational control) and future expectations (for problem-solving and planning) [37, 61]. An AIS is known as “one of the sub-systems in the economic union, composed of several sub-systems working together in a mutual coherent and consistent manner, in order to provide historical, current and future financial and nonfinancial information to all those interested in economic integration, including services to achieve their objectives” [62, 63]. Whereas, an Integrated IS is: “the system that consists of sub-systems which complete each other through their work in a harmonious and mutually to exclude the repetition of the generation of information from more than one subsystem, thereby reducing the necessary production costs of the information to the different agencies, as well as reducing the necessary time and effort needed for production” [51-53]. The importance of integrated AIS in any economic unit comes from the need to find relationships through coordination, exchange and interdependence between each of the AIS and with other types of ISs [52] (Figure 2.2). It also contributes to drawing a clear picture of the nature and volume of work done and the scheme for comparison, which contributes to the assessment of performance (comparison of the work done with the work expected and to identify corrective actions that need to be taken) [64, 65].



Based on the above, the researcher defines AIS as: “a set of sub-systems that work together in a coherent and consistent and mutual manner, using a set of materials and human input”. This is to implement a set of procedures and processes, and is in accordance with the adopted accounting principles to provide historical current and future financial and non-financial information. Having such information helps management and the relevant authorities to perform the tasks and make decisions regarding the achievement of the objectives of the business organisation. The following can be concluded:

- AIS is one of the sub-systems of the business organisation's overall IS, (such as production, personnel, procurement, etc.), which collectively aim to serve the goals of the business organisation.
- AIS consists of several lower-level sub-systems, such as financial accounting and MIS, which work together in a coherent and consistent manner to provide information to different agencies to assist them in planning, control and rationalize decision-making.

Section 2.6 defines the significance of AIS in the efficient work of an organization.

## **2.6 Significance of AIS in the efficient work of an organization**

AIS is the basic and important foundation for other IS in a business organisation. Its significance stems from:

1. The importance of accounting information that has become a vital element of production.
2. Also, it has an important role in determining the effectiveness and efficiency of the business organisation.
3. AIS reflect the interaction that takes place inside the business organisation and the external environment, including all of the influences, and gives clear, accurate and detailed information about the economic situation of the business organisation.
4. AIS is the "business organisation's eyes" since it shows, at any time, where the business organisation stands, and in which direction it is going. In other words, AIS provides suggestions on how to act and how the organization should perform according to the organization's plan.
5. AIS plays an important role in the success of the decision-maker, as it affects future forecasts, describes its vision and develops the forces that affect a certain position.

Furthermore, AIS helps in deciding the best strategic plan for the business organisation that can be applied in the long term. At the same time, the decision-maker is better able to make a choice between alternatives (decision-making).

6. It also improves the capacity of management to plan properly, establish policies and integrate the various internal and external environmental factors.
7. At the same time, it coordinates business organisation's needs and capabilities to achieve effective internal monitoring for all the material elements of the business organisation. Therefore, business organisations have tended to design and build AIS in order to control of the vast amount of necessary information for business organisation's management.
8. Also, AIS ensures reliable, valid and accurate access for all levels of management in an appropriate and timely manner, with the lowest cost in making informed decisions.
9. An AIS can add value to a business by providing personnel with accurate information in a timely manner, so that tasks can be accomplished efficiently and effectively thanks to the precise design of the system [37]. For a business, AIS can:
  - a. improve the quality of goods or services and reduce costs;
  - b. improve the effectiveness and efficiency of a business organisation's procedures;
  - c. improve the process of decision-making; and
  - d. increase the exchange of knowledge and experience.

Sections 2.7 describes the different categories of AIS.

## **2.7 Different categories of AIS**

There are several categories of AIS, depending on the type, size and structure of the business organisation. These systems can be distinguished and categorized according to several criteria as follows [7, 63, 66]:

### **2.7.1 AIS according to degree of certainty and accuracy of outputs**

Certainty and accuracy can be seen in terms of one of the following:

- **Probabilistic system:** Without using probabilities and reaction of the system to predict its cases, outputs cannot be specifically known. This is a result of certain circumstances such as planning budgets, since inputs are related to future prospects.
- **Deterministic system:** An accurate and confirmed input that gives accurate and confirmed output. If system's situation and outputs can be precisely determined, then the system is specific and accurate, such as automated systems, since computer data input produces accurate outputs.

### 2.7.2 IS according to its official availability

This may take one of the following two forms:

- **Formal AIS:** A system already exists in the business organisation on a permanent basis, and is characterized by its regular programs that operate according to systematic procedures in operating and processing data. Such programs include the financial accounting system of an organisation and the internal control system.
- **Informal AIS:** A system created for a specific need and is dismantled when no longer required; it has no systematic program to operate process data such as cost accounting in service units, and may be converted into a formal IS if there is a continued need for it.

### 2.7.3 AIS according to the integration of its sub-systems

This can take one of the following two forms:

- **Integrated AIS:** Sub-systems which complement each other in a harmonious and reciprocal way, to exclude the repetition of information generation by more than one subsystem. These sub-systems reduce the cost of information production and the associated time and effort, and characterise an effective AIS and all of its sub-systems.
- **Non-integrated IS:** A system whose sub-systems are independent and capable of working without coordination with other sub-systems, leading to increased costs, time and effort, which applies to the AIS or any of its sub-systems.

The next section discusses the relationship of AIS with management information system.

## 2.8 Relationship of AIS with Management Information System (MIS)

The partial analysis of any phenomenon does not reveal the potential benefits that it may bring. Any system should be approached as a whole because its parts or sub-systems are interdependent, integrated and coordinated in order sub-systems to achieve the benefits and overall objectives of the business organisation. Accordingly, in a business organisation, any type of activity is considered as a total system that consists of several sub-systems (Figure 2.3). The two most important activities are as follows:

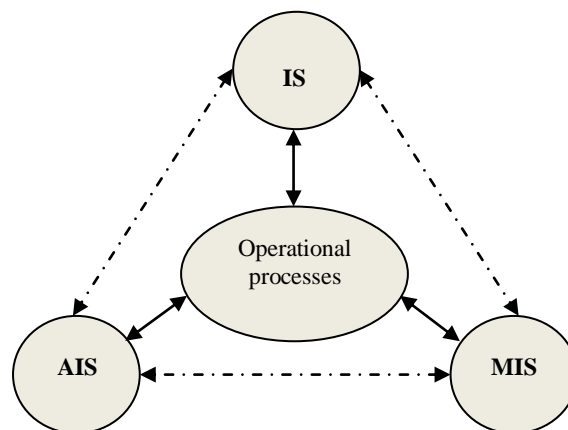


Figure 2.3: Integration between AIS, IS, MIS in business organizations

In Section 2.5, the researcher defines AIS and IS; in this section, the researcher defines MIS as:

A group of interrelated parts that interact together to convert data into information, which can be used to support management functions (planning, control, decision-making and coordination) and operational activities in the economic unit [63]. Another definition of MIS is: a system which handles all data processing related to the business organisation to provide users with the information they need to run their business organisation [61]. Furthermore, this definition extends to all IS, including project AIS. There is also much consensus among researchers interested in AIS and MIS. These converses are in terms of emphasis on the partial view in determining that one system is more comprehensive than the other, and these views may be discussed as follows:

**First view: That AIS is part of the MIS:** this is because AIS seeks to provide financial information as accurately as possible, as well as objective and relevance to internal management and external parties. At the same time, MIS is interested in all of the

information necessary for the management to achieve system optimization of available resources of the business organisation. The AIS is not a substitute for the MIS and is not separate from it, but is one of the largest and most important sub-systems of MIS.

**Second view: AIS is the platform and MIS is part of it:** This view argues that the AIS is a platform with MIS being one of its parts. The AIS has been accorded its appropriate position within the business organisation. The role of AIS is no longer limited to providing historical information only, but is extended to provide other types of information such as: the current data (specialized in the operational and regulatory procedures) and the future data (specialized in problem-solving and planning) [61]. Also, Bagranoff [67] suggests that the AIS is not limited to financial information, but it also includes all the information: “The view towards accounting system has become that it must provide financial information and non-financial, after its role was confined in providing the financial information”.

**Third view: A compromise between the two views above:** This view is adopted by the American Accounting Association which prepared a report that considered AIS and MIS as two independent systems, with separate functions but with some overlap between the two systems. The overlap represents the operational accounting, which specializes in providing the necessary data to make management decisions within the project. This is for the purpose of planning and decision-making or data provided to external parties in order to make decisions related to their investments in the project. The operational accounting is considered as an overlapping field since the accountant needs non-accounting data from other IS in the business organisation (represented by the MIS) upon providing management with the necessary data for planning and decision-making [68].

So by taking into consideration all the different views of the relationship between AIS and MIS, the researcher considers that the relationship between AIS and MIS is: The modern approach to studying IS that might exist in the business organisation that does not totally favour one system over another. Rather, this approach takes a holistic view that acknowledges the need for integration, coordination and coherence between all IS, in accordance with a uniform database. This would thereby reduce the cost of producing the necessary information, and require less time and effort. Since the integrated system of AIS and MIS information forms a large and important part of the entire system of information in any business organisation, and is represented in all sub-systems of AIS and of MIS, this helps to achieve the overall objectives of the business organisation. Commercial banks have been very quick to adopt the successive technological developments in IS. Therefore, banks and their systems are likely to be affected by many factors imposed by the nature of their

work and their transactions. Therefore, in this chapter, the researcher will clarify the meaning of AIS and its associated concepts, especially with regards to commercial banks, in the following sections.

## 2.9 AISs' functions

Researches in the literature have mentioned that the functions of AIS are limited to two main categories. Figure 2.4 below illustrates those functions [42]:

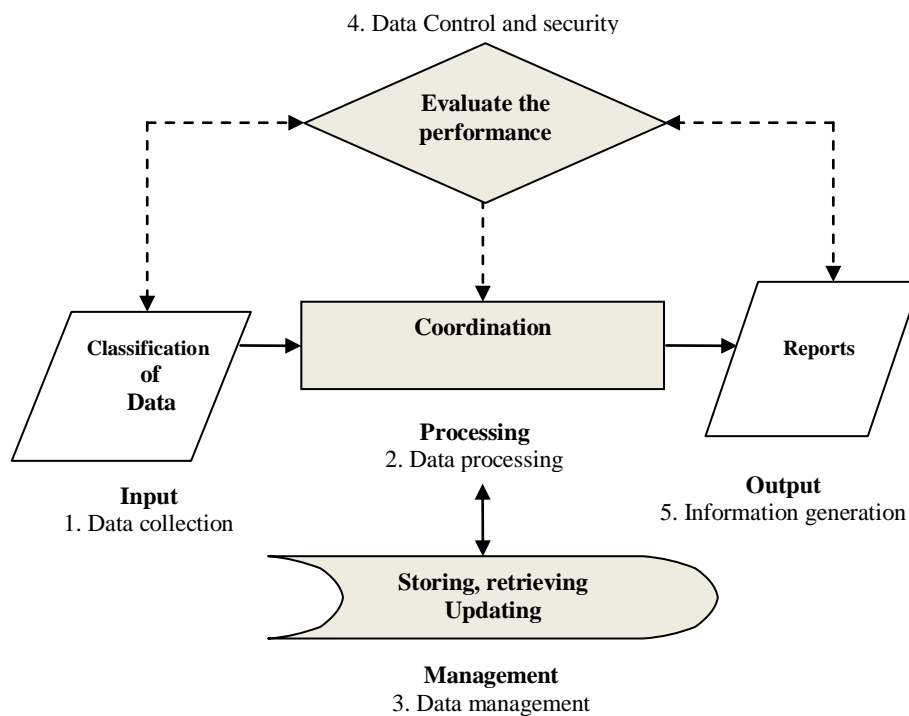


Figure 2.4: Functions of AIS and flow of work

1. **Documentation:** Documentation was the oldest and the only function, represented in registering the economic events in a business organisation, processing the data and presenting it objectively and honestly. Thus, system output, in light of this function, provides a third-party with information about the financial status of the business organisation for the last financial period.

2. **Informative function:** Emerged as a result of economic development, since the system produces information used for planning, control and rationalization of the decision-making by focusing on the present and the future.

Some argue that the production and delivery of useful information to decision-makers is the basic objective of IS, since the functions of IS must start with gathering data and end with the production and delivery of information. The most significant task is the collection and storage of data related to business activities and events of the business organisation, processing and converting data into useful information for the purpose of decision-making, and providing the management of the business organisation with an adequate means of monitoring in order to protect their assets [37]. This is done through a "data operation cycle," and is often accompanied by "data management, monitoring and security". Therefore, the AIS has five basic functions: the compilation of data from multiple sources, operation, management, control and finally extracting the information [68]. Therefore, the functions performed by the AIS in any business organisation are:

- a. **Data collection:** It identifies the economic and financial events in the business organisation, and registers them in the related documents (data), which are the system inputs, where they are gathered in preparation for operation. There should be a goal and a reason for any data collection. The main data sources are: the daily operations within the business organisation, external daily operations such as payments and collections, and the external environment such as legislation, accounting policies and internal management decisions [69]. After determining the quality and volume of data required, and identifying the persons responsible for the gathering process, the data collection process starts. This process has various sub-processes such as limiting, coding, classifying, checking and converting.
- b. **Data processing:** A set of procedures to convert data into meaningful information useful to decision makers, by which data is purified and organized by sorting, cataloguing and classification and Conclusion [36]. Fundamentally, they do not differ from the mechanism of IS, whether manual or semi-manual, or electronic. It is not necessary that these operations be done in a specific sequence or that data be subjected to these processes in order to become useful information.
- c. **Data management:** Often, raw data once collected, may be saved for the time when it is made available for operational purposes. Data management in a business organisation involves the organisation storage, retrieval, re-production, updating and maintenance of data [70]. The most important tasks in this phase are:

- **Storing:** Saving data in permanent or temporary files or databases, pending an additional operation that requires the business organisation's history of events, and serves the planning processes.
  - **Retrieving:** For additional operation or to convert it to information.
  - **Updating:** Includes modifying data to reflect the business organisation's current business status; in this phase, events are processed and updated.
- d. **Data control and security:** Ensuring data control and security ensures, thereby ensuring the accuracy of information. There are security procedures to protect data and detect any loss, fraud or change during operation, which extends to include all operations from the beginning of data collection to providing information to the user [7].
- e. **Information generation:** Delivers information to authorized persons. This also considers various factors such as timing, means of delivery, form of delivery, content of messages and how to express them. All of these factors must be consistent with the wishes and needs of the business organisation. They include the ability to regularly monitor, through feedback, any changes or developments in these needs and wishes (Figure 2.4).

The researcher believes that all these AIS functions should be considered in order to achieve the best possible level of efficiency and effectiveness.

## 2.10 Properties and specifications of an effective AIS

The AIS is characterized by a number of properties that, if available, make the system vibrant and able to perform its various intended functions. The following are the most important properties that would make the system vibrant. It [24, 71-74]:

1. has objectives that are as specific as possible so that it can be amended in an appropriate manner;
2. is linked to the business' organizational structure to provide the necessary information to achieve management objectives;



3. is appropriate for the business organization's set requirements in terms of the nature of its activity, size of its activities and operations, and the surrounding circumstances of the environment or society;
4. produces the necessary reports to serve business organization's established goals, provides integrated information, especially the external information useful for management;
5. has accuracy and high speed in data processing and transforming data into accounting information;
6. is able to assist in the preparation of plans for improving work, in order to achieve an effective contribution and measurability in accordance with the established objectives at all management levels;
7. provides regular and rapid information and reports required to achieve control and evaluate the performance of different activities;
8. characterized by flexibility with changes in goals and the surrounding environmental and technological conditions of the system to fit with changes in the business, without losing its substance;
9. is acceptable to business organization staff, and its importance and usefulness is generally acknowledged;
10. has individual operators that are highly efficient;
11. achieves internal control requirements necessary to protect assets and avoid potential fraud and misrepresentation; and
12. allows a balance to be achieved between the degree of accuracy, detail and time periods for the preparation of reports and the cost of the system so as to maintain operation feasibility.

## **2.11 AIS in commercial banks**

In this section, commercial banks are described and their significance, types, and functions are discussed.

### **2.11.1 Definition of commercial bank**

There is no agreement on the definition of a commercial bank because of the different laws and regulations governing its business among countries, and the multiplicity of its functions. In the literature, one researcher has defined it as an intermediary between capitals looking for areas of investment, and the fields of investment seeking to obtain funds. Another definition for the bank is “the business organisation that takes trading in money as a profession”[75]. What distinguishes the commercial bank from other banks is that the commercial bank receives current deposits, making it willing to pay the deposit to the depositor whenever he wants without any delay or urgency. Therefore, the point of distinction is the acceptance of its debts to the applicant to settle debts of others on the depositor [75].

In order to be classified as a commercial bank, there are certain conditions that must be met by the bank. It must [76]:

1. Acquire and provide a reasonable return to shareholders of the bank.
2. Organize investment operations of the bank’s available financial resources in order to acquire returns.
3. Exercise bank activities as a professional not as an emergency activity.

Therefore, the researcher believes that the commercial bank is “an institution or business organisation that adopts trading in money as a profession through receiving deposits. Then, uses and invests these deposits in various forms in accordance with law to achieve the required revenue and profit fulfilling the objectives of the development plan to support the national economy”.

### **2.11.2 Categories of banks**

Banks are categorized in general and commercial banks in particular, according to several criteria as follows:

#### **2.11.2.1 Nature of the activity**

1. **Central banks:** These banks are responsible for supervising and controlling other banks and directing monetary policy. This bank has a great deal of authority since it controls and regulates the banking system, and it is the issuing bank, since it has the right to issue currency and manage it. It is also called the government banker, since

it acts as the bookkeeper of government accounts, manages the reserve of gold and foreign currencies, and establishes the state's financial policy in order to achieve monetary stability [77].

2. **Commercial banks:** These are the fundamental units in the banking sector in any country, since they are banking or other non-bank businesses, the concept of which has been discussed previously.
3. **Specialized banks:** These specialize in funding certain sectors of the national economy, and therefore can be classified as follows:
  - a. **Industrial banks:** Provide medium-and long-term facilities for industrial business organisations, and contribute to establishing industrial business organisations [75].
  - b. **Agricultural banks:** Provide banking services for agricultural business organisations of the associations or business organisations, to assist them in performing their role in agricultural development [78].
  - c. **Cooperative Banks:** Provide services to the agricultural cooperative societies or social funding guarantees and simplified interest rates [79], such as the Cities and Villages Development Bank.
  - d. **Real Estate Banks:** Provide banking services to individuals or institutions or cooperative housing associations to assist with the construction of residential real estate or buildings [80].
  - e. **Saving Deposit Banks:** Provide credit facilities for small businessmen, employees and other small savers; an example is the postal savings fund [81].

## 2.11.2.2 Subcategories

This category has the following three sub-categories:

Table 2.1: The subcategories of banks

Sub-categories of banks	Types of banks
In terms of form of ownership	<ul style="list-style-type: none"> <li>- <b>Public sector banks:</b> Fully owned and its activities are supervised by the state; an example is the Central Bank of Jordan.</li> <li>- <b>Private sector banks:</b> Fully owned and managed by private sector, assuming the financial and legal responsibility before the central bank, not involving the state or its public business organisations in ownership or management. For example such banks in Jordan are, Arab Bank, Housing Bank and Cairo- Amman Bank.</li> <li>- <b>Mixed ownership banks:</b> Banks share in ownership and management by the state and the private sector. State usually resort to possess more than half of capital in order to maintain control over these banks and allow supervision of and guidance, in line with financial and economic policy [82]. Examples include Cities and Villages Development Bank of Jordan.</li> </ul>
In terms of citizenship	<ul style="list-style-type: none"> <li>- <b>National banks:</b> Having the citizenship of the state where its headquarters is located, and most of the capital is to the institutions or individuals belonging to the host state [83].</li> <li>- <b>International banks:</b> Banks that have foreign citizenship other than the citizenship of the country where they operate, and where their main offices are located. Also, their capital is mainly owned by foreign individuals or institutions [84, 85], such as the Cairo-Amman Bank.</li> <li>- <b>Regional banks:</b> Owned by the nationals of a particular area, such as a bank in Saudi Arabia and owned by citizens or governments of the Gulf Cooperation Council[86].</li> <li>- <b>International banks and funds:</b> Banks of an international character, emanating from international bodies such as World Bank and International Monetary Fund.</li> </ul>
In terms of the ramifications and proliferation	<ul style="list-style-type: none"> <li>- <b>Community development banks (Unit banking):</b> regulated banks that provide financial services and credit to under-served markets or developing communities [87]. This type of bank has one centre undertaking all of its activities, or with specific areas of activities that do not exceed a radius of several miles.</li> <li>- <b>Community banks (Local branching):</b> Limited in its branches within the state. This type of bank is locally operated and empowers staff to make local decisions to serve their customers and stockholders [88].</li> <li>- <b>Offshore bank (Regional branching):</b> Banks with branches within a specific geographic area in more than one country [89].</li> <li>- <b>International branching:</b> Large banks with branches in various parts of the world to broaden the base of their banking activities to reduce risk and increase profitability [90].</li> </ul>

## **2.12 Functions of commercial banks**

One of the most important objectives of the commercial banks is their quest for a return and their contribution to the national economy. In order to achieve that, a range of functions have to be performed. It is difficult to identify those functions since commercial banks have miscellaneous and renewable services, and no longer revolve around the operations practised for hundreds of years such as receiving deposits and granting loans. However, bank mentality changes regarding the methods and means of meeting customer wishes and requirements and are subject to continuous development [75]. Banks are not limited by anything other than the imagination of their management personnel, and the legislation and laws of the state within which it exercises its activities. The Jordanian legislature has identified a set of functions for each licensed bank in conducting its banking business as follows:

1. Receiving cash payable on demand deposits or according to other arrangements and retractable by cheque, money order or an order of exchange and loans and credit facilities.
2. Sale and discount promissory notes, drafts, coupons and bonds for commercial purposes.
3. Undertaking procedures for banking transactions with correspondents and access to banking facilities.
4. Buying and selling foreign currencies, bullion bars and gold and silver coins, stocks and bonds.
5. Issuing letters of guarantee, discount, and open letters of credit and the collection of shipping documents.
6. Collecting cheques, bonds, money orders, purchase and sale of state bonds and governmental organizations' money transfers.
7. Acting as agent or the trustee as a correspondent or agent for the banking and financial institutions.
8. Financial leasing, which includes rental of fixed assets for a certain period, for a specific fee, with a promise to sell at the end of the term and conditions to convert the lease to sell or relinquish ownership of the lessor to the lessee.

## **2.13 Key attributes required of an AIS in commercial banks**

Accounting in a commercial bank is only an application of the general theory of accounting based on the principle of double-entry with what it implies of the balance. Banking operations are carried out by specialized departments, with accounting departments playing an important role in all activities. When banking services are spread over a wide geographical area, branches need to ensure that the accounting relationship between the bank and its branches is clarified. Banks also enter into relationships of:

- a. banking exchange services with local banks and the central bank; and
- b. relationships with Arab and foreign banks to carry out their various functions.

Furthermore, AISs differ from one business organization to another, according to the size and nature of the business organization's operations and data required by management and external supervisory and control bodies. Therefore, the advantage of the accounting system in a commercial bank is that it has characteristics and advantages that make it different from other accounting systems. Its most important characteristics and features are:

1. Accuracy, clarity and simplicity in designing the documents to facilitate conducting entries without confusion or ambiguity, since bank operations are very sensitive and mistakes can be costly.
2. Provides alternative accounting methods and appropriate for the momentum of the various, repetitive and similar banking operations.
3. Takes into account the bank's management, internal subdivisions, and the nature of the relationship between bank's central management and its branches.
4. Avoids duplication between staff or departments' competencies and clearly specifies the responsibility of each of them, considering the nature of an operation that might require the involvement of more than one staff or department.
5. Control of daily operations to check their balance, daily transactions are recorded in various registers, extracts the daily trial balance to ensure the validity of the daily operations.
6. Contains regular accounts for the purposes of monitoring the implementation of banking operations.

7. Contains many intermediate account to provide type of internal control, since most of bank operations need some time to be completed and to follow-up its implementation phases.
8. Flexible and able to prepare and process a large number of statements and periodic data required to meet the needs of bank's management and third parties in a timely manner.

## 2.14 AIS features

The AIS in banks includes several essential components to ensure that it can achieve the required objectives. Some of the important objectives are shown in Figure 2.5 below:

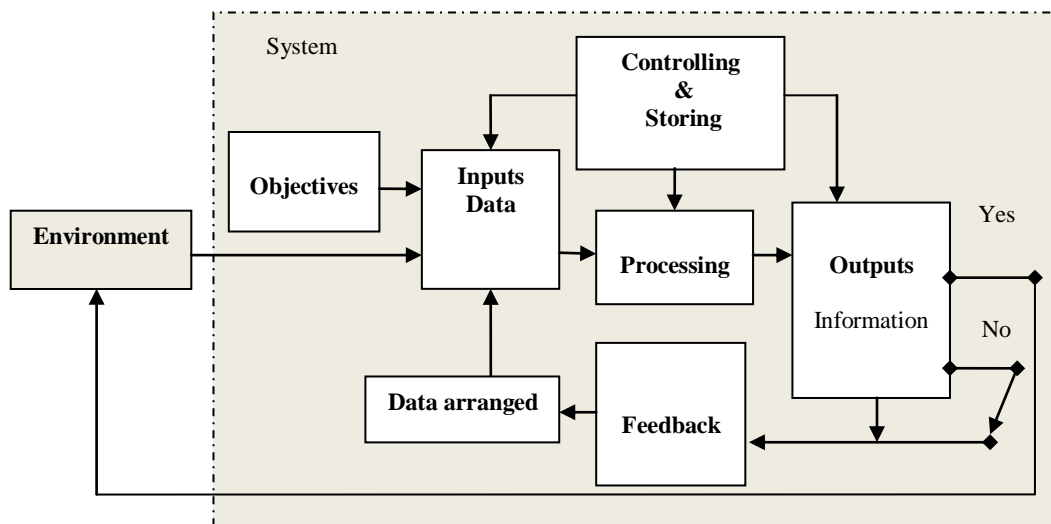


Figure 2.5: AIS features

Figure 2.5 shows AIS features; explanations in the sub-sections as follow:

### 2.14.1 The existence of objectives

Eventually, there is no system without a goal. A system must be efficiently designed so that its goal is to cater for all parties and meet their needs. This is the primary justification of its continued existence. It also decides how it works and how to organize, manage and use its available resources, and coordinate among them to ensure the achievement of these goals; furthermore, the system aims to achieve a set of key objectives that will be addressed in

Section 2.14 of this chapter when the effectiveness of AIS is discussed. This undoubtedly depends on the existence of an effective accounting system.

### **2.14.2 Data-processing cycle**

Work processes in the IS go through a specific and organized set of stages that end with the achievement of the system's objectives. Therefore, the processing cycle of accounting system data in commercial banks consists of four basic stages:

#### **2.14.2.1 Input cycle**

The starting point of the system's work is gathering data from various operations departments of the bank, describing the events entering the system, and obtaining the objective evidence supporting the financial events. Such evidences include quantitative, economic, behavioral data, laws and regulations and instructions governing the operation of the business organization's accounting system. The collected data must be relevant to the subject being addressed; otherwise it can lead to confusion for the decision maker, since the documents are the first source of transaction in the accounting system and an integral part of it. These documents must be designed to achieve a central goal which is the ability of each document to contain the best amount of data.

#### **2.14.2.2 Data processing cycle**

The technical aspect of the system concerns all operations carried out on the input (data) in order to be converted to a new form of meaning and value (information). This is done in accordance with scientific provisions, principles and rules by documenting, transferring, categorizing, classifying, summarizing, analyzing, and interpreting the operations. Operations may be manual, mechanical or a combination of the two methods, which are the most commonly used since the proliferation of computer usage [39].

The manual system consists of sub-systems that flow into the general accounting department, through which we obtain the final outcomes. The researcher believes that this is no longer applied in fact, for the spread of automated systems, especially in banks; because of the automated system, all banking transactions are directly entered by the respective departments. Once data is entered into the computer, the program documents the transaction,



and automatically carries it over to a database which eventually will provide the required reports.

#### **2.14.2.3 Outputs cycle**

A final product of the system results in the receipt, distribution or communication of accounting information to recipients who use it in decision-making. In other words, it is the result of interactions of operational processes of inputs in the context of environmental and subjective variables for those who can use and benefit from them. Such outputs are in the form of reports and financial statements or schedules or different information [39] regarding the income statement and financial position, and statement of cash flows. Also, output includes a set of reports (cash, current accounts, foreign currency and central bank reports) and the daily and monthly trial balance, as well as the daily transactions report. These reports are submitted to many internal and external parties to assist them with assessing performance and making many decisions.

#### **2.14.2.4 Data management cycle**

In this cycle, data are encoded, protected, stored, updated, and retrieved in order to organize inputs and operations, through controlling inputs, in order to produce outputs in a timely and appropriate manner. It is worth mentioning that data need to be managed during the three previous cycles. Thus, the researcher can say that the main features of the AIS in the bank are the input (represented by the data fed into the system) for operational processes and outputs (represented by the generated information). Furthermore, the data is stored as information (database), and finally leads to the feedback process, linked to the system's target goal (Figure 2.5).

#### **2.14.3 Knowing IS environment**

The definition of environment is "a combination of factors that have an impact on the success of activities in achieving the set goals." The AIS environment in a traditional bank consists of internal and external environments.

- **The internal environment:** Sub-systems constitute the AIS in the bank, such as current accounts, remittance system, letters of credit, etc.

- **The external environment:** Includes the environment existing outside the system such as the requirements of beneficiaries and laws. Such laws pertain to banking law, central bank, technical development, and the use of studies related to behavioral aspects.

#### **2.14.4 Availability of an effective communication network**

In order for the bank to achieve its objectives, AIS must interact with the surrounding environment, through a network of contacts involving sub-systems. This network is a major resource; if isolated from its environment, it breaks down quickly. Environmental interaction cannot produce an effective system unless there is an effective communication network to achieve that interaction; otherwise, the system is unable to perform its desired function [91].

#### **2.14.5 Components of the AIS**

Any system must have its infrastructure components that interact with each other through a network in order to achieve the desired objectives. That infrastructure is evident in the set of resources available to the system. Some researchers believe that the AIS, in light of computers, consists of a set of nested elements and parts that interact with each other to achieve the common objective(s), as follows [91]:

1. **The human element (a group of individuals):** Those who implement all system procedures, who undertake to manage the system in terms of preparation, design, operation and extracting the information. These human elements are responsible for operating and running the computer, feeding it with the necessary data and programs for the operation, and determine the quality of output.
2. **Hardware:** The equipment used for data entry, operation and extraction of information, including all computer components and accessories, i.e., telephone, telex, facsimile, typewriters, calculators, and any communication means and preparation of data.
3. **Drivers:** Software used by the system, such as operating systems for the control of computers and software applications that are used to meet the needs of the management.

4. **Data:** The basic material, essential to the accountant to execute the instructions of the application literally, in order to obtain the information.
5. **Networks:** The basic infrastructure for communication between computers and the related programs.
6. **Databases:** A storage device that stores data in various storage media.
7. **Operating Procedures Manuals:** Print-outs in the form of booklets containing instructions for the preparation of data and how to enter them, as well as instructions for operators who run the system.

In considering these factors, it is evident that the banking AIS consists of a set of human elements represented by all staff in the IS department, who use a range of material parts and supplies for the performance of accounting work, such as hardware and software, books and records, etc. in accordance with specific procedures and accounting rules to record, operate data and deliver its results in a series of reports and financial statements for all parties that might benefit from them in decision-making. It is worth mentioning that the components may be either tangible (personnel, machines, documentary and book group), or intangible (i.e. non-physical such as rules, procedures and principles) which are inseparable twin components.

#### **2.14.6 The availability of effective internal controls**

Internal controls refer to a set of rules and procedures that support the achievement of system objectives. It is a system of integrated elements (people, structure, processes and procedures) working together to provide a reasonable assurance to achieve the operational goals of the business organization and the objectives of the IS. This is done by comparing the actual performance of what was planned through careful design of the documentary cycle, allowing management to carry out their responsibilities in maintaining the assets and the protection of others' rights, since internal control has become one of the important aspects that is hard for management to ignore, given the nature of its activities to deal with the funds of depositors [37]. Undoubtedly, the absence of strict rules and procedures of internal control will lead to failure and inability to achieve its objectives.

## **2.15 The effectiveness of AIS**

### **2.15.1 The concept of effectiveness**

In order to achieve its objectives, AIS has to perform its functions satisfactorily as planned, by providing correct and useful information. Although the concept of effectiveness is widely-used by many researchers, there are various opinions about its precise meaning. Hence, the concept of efficiency in the literature of IS varies. Following is a review of these concepts:

- The "degree of compatibility of the actual output with the planned outputs" [92].
- Another belief is that any judgment about the effectiveness of the AIS must be based on effectiveness criteria, since effectiveness is achieved if the system achieves the general objectives set for it [24].
- Others employ the term 'needs'; thus, effectiveness in their view, is "the system's ability to achieve or meet the needs of users, but needs are merely nothing more than the objectives"[93].

Given the various definitions of effectiveness, it appears that effectiveness varies in terms of the form it takes, and is consistent in terms of substance and outputs. The majority of definitions relate effectiveness to objectives or effectiveness and output, since effectiveness is selecting or determining the best method of performance in order to reach a desired and pre-established goal. The researcher concludes that effectiveness is associated with the ability of the accounting system to achieve its objectives, and the system that achieves its objectives is effective, whereas the system that does not achieve its objectives is not effective. The researcher defines an effective AIS as "the ability of the accounting system to achieve its objectives, mainly to provide information characterized of its convenience and reliability that help internal and external decision makers to achieve their goals".

### **2.15.2 The difference between effectiveness of the system and system efficiency and performance of the system**

The terms 'system efficiency', 'system performance', 'efficiency of the system' often refer to the success of a system and are used synonymously although there are significant differences between them as follows:

### 2.15.2.1 The concept of system efficiency

All the definitions of efficiency state that it is more than just a link between inputs and outputs, as indicated by the following definitions:

- Efficiency was defined as the relationship between the cost of inputs and data operation with the value of the information provided by the AIS, i.e., comparing the benefit of output on the basis of the cost of inputs and operations [68].
- Alvin and Arens defined efficiency as the degree to which costs are reduced without negatively affecting efficiency [73].

The researcher believes that the efficiency of AIS is its ability to optimize the use of human and material resources to obtain information of appropriate quality and quantity at the appropriate time and with minimal costs. There are several opinions on this as follows:

Thong [71] pointed out that effectiveness answers the following question: Are you doing the right thing? Whereas, efficiency answers this question: Are you doing things correctly? Therefore, effectiveness reflects the system's achievement of objectives while efficiency reflects the relationship between the inputs and outputs of that system. However, Ryker [72] pointed out the difference between them through the standards of efficiency and effectiveness; since the system criterion of effectiveness determines whether the system is achieving its general objectives. On the other hand, the efficiency criterion determines the relationship between the inputs and outputs of the system, and how they relate to each other and how they are controlled. Ryker also pointed out that every efficient system may not necessarily be effective and vice versa since a system might convert data into information efficiently without achieving its objectives; hence, then efficiency is not achieved. The researcher distinguished between efficiency and effectiveness as the following table shows:

Table 2.2: Explains the difference between efficiency and effectiveness [92, 94, 95]

<b>Difference</b>	<b>Efficiency</b>	<b>Effectiveness</b>
1	<i>Doing things correctly</i>	<i>Doing the right things</i>
2	<i>Solve problems</i>	<i>Produce creative alternatives</i>
3	<i>Maintain and protect resources</i>	<i>Ideal use of resources</i>
4	<i>Follow-up returns</i>	<i>Get results</i>
5	<i>Reduce cost</i>	<i>Increase profit</i>

As mentioned above, the concept of system effectiveness in ISs' researches and studies varies, and some argue that the effectiveness of IS reflects its performance. Generally, the arguments are that effectiveness is part of a performance appraisal process with stronger

logical grounds. There is a fundamental difference between the concepts of effectiveness and performance. Effectiveness focuses on the success of the system as a whole, since it is not the only presumption for the system performance, but one of performance dimensions. Performance includes effectiveness, efficiency, and flexibility, to name a few criteria. The performance of IS is evaluated from two perspectives: assessment of effectiveness, and evaluation of efficiency. Aladwani [96], measured IS performance in terms of the effectiveness and efficiency of task outcomes and the human outcomes represented by staffs' satisfaction, and the regulatory outcome in the added value of the business organization. Aladwani argues that the effectiveness and efficiency of IS are more important than satisfaction. Beven pointed out that measuring the performance of the IS does not entail measuring only the effectiveness, efficiency and satisfaction, but includes the details of the users' properties, goals, and the appropriate environment of usage. It was revealed that measuring effectiveness is linked to the objectives of the user, which is related to the extent to which objectives are accomplished accurately and completely. The measurement of efficiency is linked to the level of achieved effectiveness, relative to the resources used, and satisfaction measures acceptance and simplicity of use [97]. The researcher argues that AIS performance is the system's ability to process data and financial events of the business organization in order to provide accounting information that meets the needs of users efficiently and effectively and produces satisfaction.

### **2.15.3 Methods of measuring the effectiveness of the AIS**

Examining the parameters used in the studies and literature on measuring effectiveness, performance and success of IS, the researcher found that many of these studies used the same standards as synonymous concepts. Effectiveness is considered as one of the most effective aspects of IS that have been measured and evaluated in the literature. Measurement method and style of IS effectiveness differ based on assessors' views, and their aspects of emphases. Therefore, the researcher found that various and multiple measures have been used to measure effectiveness, at different levels, which is obvious in the multiple approaches to measuring the effectiveness of the system as follows:

- Yuthas and Eining [98] measured the effectiveness of the system according to three variables: resolution achievement, user satisfaction and system usage, and argued that the most direct one for measuring effectiveness is resolution achievement. They focused on system output to judge the nature and extent of usage (nature of usage in

terms of the number of reports delivered by the system. Also, the extent of usage in terms of the duration of the reports delivered) as benchmarks of usage, which reflects the level of interaction between the user and the system.

- Seddon and Yip [99] argued that the difficulty of measuring the effectiveness or quality of IS may directly force a lot of researchers to conduct indirect measurement by measuring the satisfaction of staff working within the system. This is done by using five factors that measure accountants' satisfaction with the computerized general ledger by using electronic data processing and its services, user's knowledge and intervention, quality of information, ease of use, and characteristics of the general utility of the ledger system.
- Finally, Abu Khadra [100] argues that criteria of AIS effectiveness rely on a set of objectives that the system is expected to achieve, which vary according to its creators; therefore, different alternatives have emerged to measure effectiveness, including:
  1. **Economic effectiveness:** By analyzing cost benefits (feasibility study), the most common method, and commonly used when selecting IS project, if the benefits resulting from its use exceed the costs of maintaining and running it.
  2. **User satisfaction:** Personal measurement of the degree of success of the system, concerned with measuring how the user accepts the system. If the user has a minimum level of satisfaction in using its output, s/he will cease using the system.
  3. **Performance standards method:** According to this method, a list of requirements from the AIS is prepared to decide the effectiveness of the IS, where the actual fulfilment is compared with the set criteria. Results of comparison are used for deciding the effectiveness of the system, and determining amendments or additions to be made to the system, or even eliminate the whole system, based on the size and significance of discrepancies.

## 2.16 Conclusion

AIS is important because of the important role that information plays in contemporary life, especially given the current global IT. The information produced by such systems is a basic

resource of all types of business organisations, especially the commercial banks. Accurate and timely information is vital to decision-making, and assists banks to achieve their goals and strategies. On the other hand, IS provides an effective means of communication between various management levels in banks, facilitating the exchange of information. Thus, providing effective and efficient IS in all types and levels, contributes, to a great extent, to commercial banks' achievement of goals and enables them to conduct their activities in harmony with the prevailing circumstances. In the next chapter, the researcher will discuss the assessment of business organisations' strategic performance.



## **Chapter 3 -**

# **Assessing Business Organization Performance**

### **3.1 Introduction**

Performance is one of the aspects to be considered when measuring a business organization's output. In this chapter, the researcher will discuss the concepts of performance, performance management, key performance elements, performance assessment, significance of measuring performance, objectives of performance assessment, different levels of performance assessment, different areas of performance assessment, performance assessment steps, methods of performance measurement, approaches to performance measures, performance assessment IS and AIS performance and the factors affecting its measurement.

### **3.2 Concept of performance**

The notion of performance is a broad and developing concept characterized by dynamism due to the evolution of businesses in terms of the changes that they make in attitude and performance as they adapt to changes in circumstances, the external environment and internal factors. On the other hand, this dynamism in performance has led to disagreement between researchers and scholars in this field with regard to its indicative content. Although numerous researches and studies have focused on this concept, the differences in the criteria and standards adopted by researchers when studying and measuring performance, have led to differing opinions. The concept of performance is one of the most commonly and widely used concepts in the field of business administration, and attracts a broad range of researchers and intellectuals, especially in economics. The concept of performance in general refers to the act that leads to the completion of work as expected. This is characterized as comprehensiveness and continuity. Therefore, it is considered as the determinant of a business organization's success and survival in its target markets. At the same time, it reflects a business organization's ability to adapt to its environment, or conversely, failure to achieve

the desired adaptation [101]. Performance also reflects the issuance of socially accepted rules for a specific activity [102]. With this definition, the researcher concludes that performance is related to an act and social knowledge which leads to acquiring social acceptance for activities conducted by the business organization, in addition to economic legitimacy. Some look to the business organization's utilization of human and financial resources, and the level of effective and efficient use so as to enable the business organization to achieve its objectives [103]. This definition implies that performance is a result of interaction between two major elements: the method of using a business organization's resources, the efficiency factor, and the results (objectives) achieved through that usage which are the effectiveness factor. Also, the same definition implies that the significance of this concept of business entities lies in the belief that performance is used to judge the ability of these entities to achieve their objectives. Moreover, it lies in the extent of their commitment to reach that "extent of rationality of the adopted method". From another viewpoint, it is the business organization's ability to maintain continuity and survival, achieving balance between the satisfaction of shareholders and staff [104]. This definition denotes that performance is a measure by which to judge the extent to which a business organization achieves its main objective, which is to survive and continue its activities in light of competition, maintaining a balance in rewarding shareholders and staff.

### **3.2.1 Extraction performance concept**

In the previous section it can be noticed that:

1. There is a difference in researchers' views on determining an accurate concept of performance. For example, some of them focus on the performance of the business organization as a whole, while others focus on the business organization's performance on the business organizational unit's level, while others focus on the performance of the staff.
2. Performance focuses mainly on the final outcome of the regulatory activities, taking into account when and how to achieve these goals.
3. Performance focuses on the final result that aspires to reach the highest possible return at the lowest possible cost.
4. Successful performance stems from the development of sound project objectives, taking into account rectifying distortions to achieve those goals efficiently and effectively.

From previous discussions, it is already clear that there are differences between the earlier definitions of the concept of performance. In this study, the definition of performance will be considered as follows:

“It is the extent of efficiency and effectiveness of the business organization to achieve its desired general and secondary objectives in all fields, through the legislations established for that business organization. This can be expressed through a set of activities and events that contribute to achieve these goals with the highest possible return, under the control of the factors affecting the business organization and the surrounding environmental conditions and the available possibilities of production factors”. In the next section, the researcher will discuss performance management.

### **3.3 Performance management**

The challenge in the performance management process is to first determine whether there are any difficulties preventing staff members from devoting their best efforts to implement the strategy of the business organization they work for. In this context, responsibilities of each staff and the objectives to be achieved through their positions should be defined accurately. More precisely, the objectives must be defined precisely, not imposed randomly by superiors, but they must be subject to discussion, negotiation and agreement of all staff concerned. Objectives should be specific and measurable in order to be easily verified [105]. Furthermore, it is argued that performance management is a continuous process of communication and interaction that is conducted jointly between staff and the direct supervisor [106]. The aim is to reach clear expectations and understanding of the work that should be completed. Business organizations are required to assess their performance systems and programs regularly; therefore, designers of programs need to put in place strategies for ongoing performance assessment. Methods and questions used in the assessment have to be the same as used those during the programs' design process and for the initial assessment of the business organization [105]. Assessment enables the reviewing of staffs' previous achievements and results achieved for the business organization, by saving and classifying information, and searching for ways to improve future business organizational performance. This fosters an atmosphere of openness and credibility and encourages staff to speak frankly about all aspects of work, including their proposals and ideas. This provides an organization with accurate and correct information on which to base its policies and plans for the future, direct its staff to clarify their ideas, and determine level

of success of the performance assessment methods used in the business organization. Also, this will continue to encourage staff to change their behavior in accordance with the desired organizational culture [107]. Performance management sends clear signals to both managers and staff regarding the results that concern the business organization, and the performance required. The granting of bonuses to managers and business units that achieve these results will prompt those with poor results to take steps to improve their performance. [108]. The key elements with which performance have to be measured are (Figure 3.1):

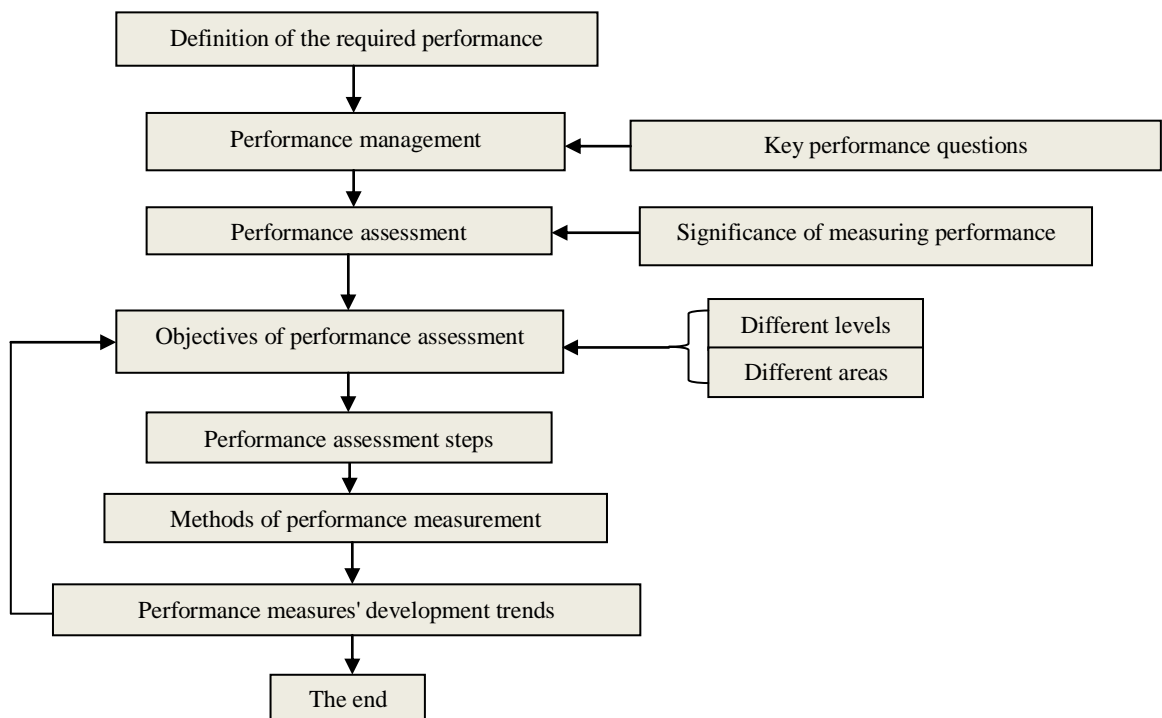


Figure 3.1: Performance management in business organization

Figure 3.1 demonstrate the performance management in business organization; as explained in the following sub-sections:

### 3.4 Key performance questions

Key performance questions reflect the important measures that are needed to accomplish the desired strategic objectives, instead of assessing the business organization using the financial criteria. Kaplan and Norton proposed using a method to combine financial and non-financial measures. They also called for using a means that combines the results of activities that actually occurred with other operational procedures in consumers' satisfaction field, and

combine the nature of internal administrative processes in the business organization and its activities in the field of innovation and continuous improvement. Considering them as integrated standards of performance, this requires the management to formulate specific objectives in the following areas [109, 110]:

- ▶ **First:** For financial performance:

*How do we appear in the eyes of shareholders?*

- ▶ **Second:** For performance in terms of consumers:

*How do the consumers see us?*

- ▶ **Third:** Regarding the internal environment:

*Where must creativity be at its highest levels?*

- ▶ **Fourth:** In innovation and learning fields:

*Can we continue the process of continuous improvement in all fields?*

In the next section, the researcher discusses performance assessment in detail.

### **3.5 Performance assessment**

Performance Assessment is a key element of the monitoring process of a business organization. This process:

1. assesses the actual performance of all the business activities;
2. assesses the overall actual performance against the pre-specified indicators in order to detect negative and positive deviations from the identified objectives;
3. identifies the centers in charge, traces problems to their causes to be avoided in the future, and judges the efficiency of accomplishment, both at the individual level or at the level of the business organization as a whole. This identification is a means by which to assess the development and status of academic, physical, social, moral, and skills performance [111-113].

Latham and Seijts [114] define the term 'performance assessment' as a systematic process designed to enhance the performance of business tasks and introduce these standards to staff, assess the performance of staff based on these standards and discuss the results of the assessment with the staff. Performance assessment of a person is generally defined as "the process of determining the level of performance to work on tasks entrusted to him during a previous period of time. Also, assess personal capabilities and potentials, in order to identify performance weaknesses to be addressed, and strengths to be promoted and developed. Performance assessment to decision-making of the procedures concerned with job's future affairs, such as promotion, transfer, rewards, job termination and others" [115]. Then, the results of the actual performance are compared with the anticipated performance. This comparison is made by preparing performance reports through which any deviations in implementation are identified, their causes established, and necessary action is taken, thereby ensuring the efficiency and effectiveness of an activity [116]. Performance assessment is intended: "to note staff's achievement by his direct supervisor or colleague at work, and determine the level of that achievement through developing certain assessments, using certain measuring criteria and tools. The process of measuring achievement is usually made periodically, annually, semi-annually or quarterly, as the organization finds appropriate" [117]. In this study, the researcher regards performance assessment as a formal system designed by human resources management in the business organization. It includes a set of scientific principles and rules and procedures according to which the assessment process is applied to staff, superiors or work teams. This is important in detecting the problems facing the accounting information systems in terms of persons in charge of them. Hence, the researcher can say that the process of performance assessment provides useful information to management to help them detect deviations caused by weakness in the human capacity. However, these deviations can be corrected through training, counseling and rehabilitation, increased staff supervision. On the other hand, performance assessment leads to the diagnosis of good achievement for the purpose of compensation, promotion, and transfer. This assessment serves the individual employee since it provides him with a statement of his potentials and weaknesses in performance, which motivates him to develop himself and upgrade his efficiency. However, most administrators are unaware of the assessment field, its simplicity of operation, and its benefits or significance. In the next section, the significance of measuring performance is discussed.

### 3.6 Significance of measuring performance

There is no development or action without measurement; if a business organization does not know its status in terms of the facts of its operations, then its future is not predictable. Thus, it would not reach its targets, in terms of achieving its strategic objectives. This is well-expressed by the famous statement: "what cannot be measured cannot be managed". The significance of measuring performance may be summarized in the following points [118]:

1. **Report:** Measurement provides a specific mechanism for reporting on work performance to management.
2. **Decision-making:** Results of measurement contribute to proper decision-making.
3. **Plan Execution:** Results of measurement improve the business organization's position in decision-making to continue implementing its strategy and plans.
4. **Performance Development:** Measuring performance improves the reality of internal relations among staff, as well as external relations with customers.

Measuring and assessing staffs' performance is one of the most important activities or functions that must be the first step in human resources' management in all different kinds and patterns of activities and areas of business organizations. This is because their role in providing the necessary information about the performance of the business as part of efforts and goals which the business organization aims to achieve is important. Such information includes [119]:

1. Performance information on how the staff performs tasks and levels of achievement in the light of the business organization's identified strategy and objectives, as well as information on the weaknesses and strengths of staff that need to be addressed.
2. Behavioral information on the extent of staff commitment to work behaviors that improve performance outcomes.
3. Development information to improve the individuals' work performance.
4. Reference information to redress the deficiencies in the business organization's policies and regulations.

The performance assessment process is very important for business organizations. The significance this process can be recognized by identifying the extent of a business

organization's benefits in general, and managers and staff in particular. The process can: [111, 120-122]:

- a. Provide information on how the business is conducted, in order to define responsibility and accountability for mistakes. Such information is also useful in the development and improvement of staff's performance, thus provides senior management with indicators about the overall level of performance of the business organization.
- b. Enable senior management of a business organization to assess the extent of supervisors' effectiveness in the development of staff under their management.
- c. Assist senior management to ensure that all staff members are fairly treated and that any issues have been documented appropriately. This is an essential step in supporting the soundness of management's position in case of staff complaints regarding promotion or termination of services.
- d. Help staff to recognize the weaknesses and strengths of their work, rectify their mistakes, develop their skills, achieve what they need for promotion, and receive rewards, and rewarding compensation.
- e. Maintain high staff morale, consolidate relations between managers and staff, especially when staffs feel that their efforts are appreciated by management, and that assessment seeks to address performance weaknesses.
- f. The assessment process is considered as one of the basic techniques in detecting training needs, thus helping to determine the types of training and development programs that are necessary.
- g. Contribute to the development of human resources management plans, develop and design training programs, and identify performance standards, thus contributing to raising staff 's level of performance in general [112].

The above shows the importance of performance assessment at all levels of a business organization, and its role in attaining the target goals. Therefore, the correct application of performance assessment produces the right decisions and become a catalyst for the management to make many staff-related decisions, including: identifying and rectifying the causes of poor performance, planning the professional development of staff, and raising staff awareness of new systems, especially the accounting systems.



### 3.7 Objectives of performance assessment

Determining assessment objectives is the starting point of designing any system of performance assessment, due to its importance and its impact on the design and formulation of the rest of the other system elements. Hence, it is necessary to identify the most fundamental objectives of the assessment process in order to optimize the performance of management and the business organization. The most important of these objectives are [123]:

1. Rationalization of cost.
2. Assistance in planning.
3. Reducing the rates error risk upon developing plans.
4. Determining stages of implementation and follow up the progress of plans and strategies.
5. Achieving cooperation between units and departments involved in implementation.
6. Guide the efforts required to implement plans.

These are depicted below in Figure 3.2.

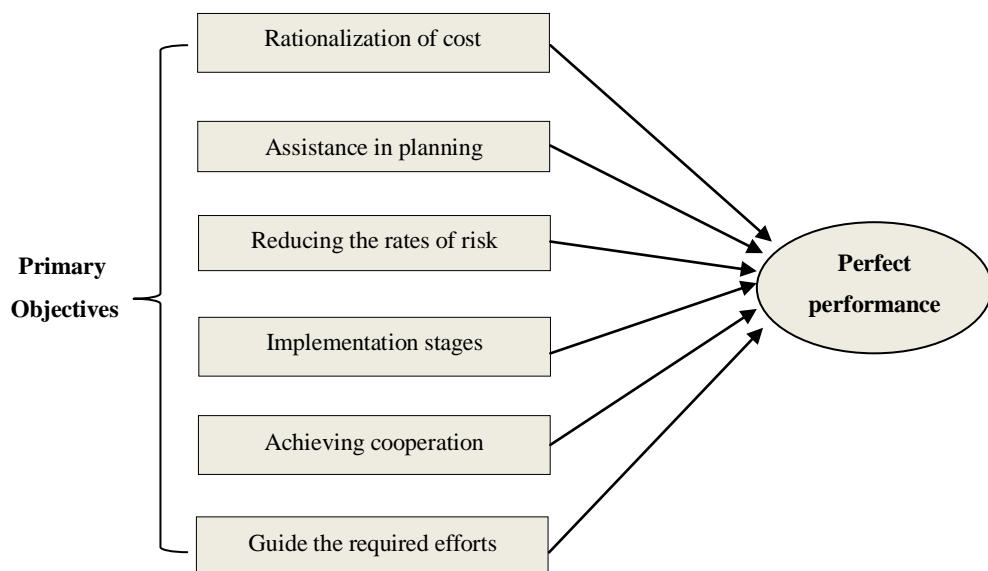


Figure 3.2: Objectives of performance assessment

Wiese [124] and Bukleg [125] believed that an effective and strictly enforced performance assessment system results in multiple benefits that help executives to make decisions related to management matters, such as rewards, promotions and transfers on the one hand, and helps staff to organize their time and efforts to complete assigned tasks on the other hand, in addition to increasing the extent of staff compliance and satisfaction.

### **3.8 Different levels of performance assessment**

Miller [126] discussed the objectives achieved by the performance assessment process according to three levels (the business organization, managers, and staff). These are as follows:

#### **3.8.1 Business organization level**

This level creates an environment of trust and ethical conduct through the confirmation of the practical basis of assessment and objectivity in decisions. This saves the organization from the prospects of being criticized for assessing its staff based on random or personal considerations, and improves staff performance by utilizing their capabilities and encouraging their aspirations to progress within the company. As well as the development of training requirements, the indicators of work performance achieve objectivity through an analytical study of the work and its requirements, and an assessment of human resources' programs and management methods. This is because the assessment process is a direct means of assessing the soundness and success of the already-established methods, and the mechanism of the information systems used to produce or process information.

#### **3.8.2 Manager level**

Performance assessment at the manager level is done as follows:

Identify staff's performance in general; improve relations with staff by creating full opportunities to discuss work problems with any of them, which ultimately leads to the process of assessment becoming a good tool to increase awareness. Also, performance assessment can increase mutual understanding between managers and staff, develop

managers' capabilities as supervisors and mentors, and enable them to make appropriate decisions regarding staff.

### 3.8.3 Staff level

Staffs' feelings of justice and their efforts to complete work tasks are taken into consideration. The process of assessment will strengthen the staff's belief that their efforts are contributing to the achievement of organizational goals; they might also be motivated to work harder to receive rewards and avoid penalties. The performance assessment process contributes to sending appropriate messages to individuals which are intended to modify their behaviour (especially with respect to accounting information systems), and developing their environment in practical and objective ways that are appropriate for modern systems.

## 3.9 Different areas of performance assessment

Business organizations might, as a result of adopting a performance assessment process, seek to achieve three areas of objectives (strategy, management, development) as shown in Figure 3.3 below [127].

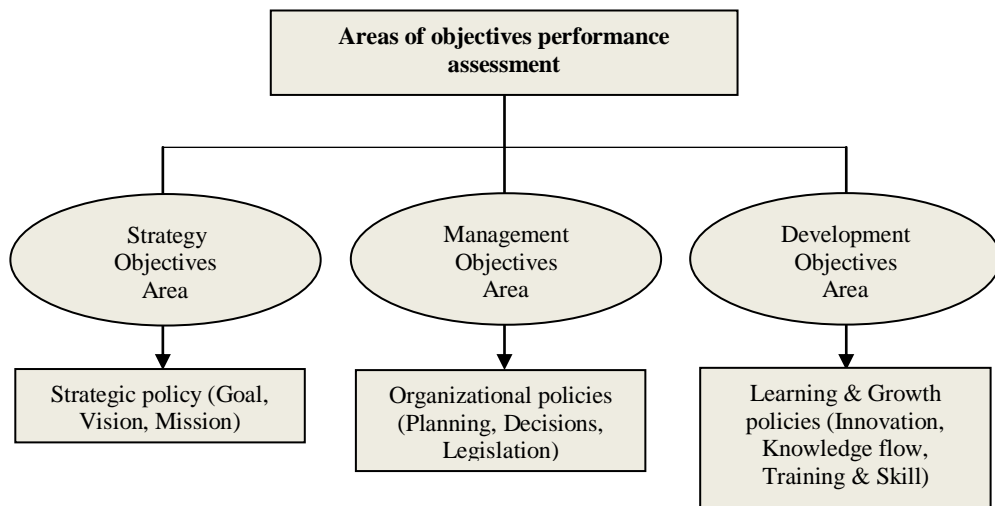


Figure 3.3: Objectives performance assessment process

### **3.9.1 Strategic objectives area**

As a strategic measure, a business organization will use the performance assessment process to create a link between staff activities, and organizational goals and objectives. The effective implementation of strategies is based on determining the desired results, and patterns of standards and systems, and the information retrieval that helps staff to fulfill their potential and develop behaviors that will produce specific results. To achieve this, the performance assessment process should be flexible, because when the objectives and strategies of the organization are changed, management processes and outcomes and patterns of behavior, capabilities and performance levels need to change also, to harmonize with those changes.

### **3.9.2 Management objectives area**

Business organizations rely on information from the performance assessment process, especially in making many decisions, most significantly those related to: salaries, wages, promotions, work lay-offs, and individual performance assessment. In spite of the significance of these decisions, many managers, who are considered as the main source of such information, consider the performance assessment process as a routine practice to achieve job requirements, although they are not comfortable with the process. Hence, they may tend to over-assess or give equal assessments, which leads to loss of objectivity in the assessment process [128].

### **3.9.3 Development and improvement objectives**

The third objective of the assessment process is the development of staff and development of methods to improve their performance at work. When an employee does not perform his work as expected, the human resources administrator seeks to improve this performance through feedback derived from the performance assessment process. This should not be limited to its role in identifying areas of weakness in performance, but also the cause of weakness, and whether it is a result of lack of capacity, incentive or work relationships [126]. Human resources management seeks permanent and continuous development of performance assessment to obtain results with high credibility and objectivity since the process of assessing performance is the main base and the major source of information, on which various policies are based [114, 129, 130] [131], including:

- a. **Transferring staff policies:** These policies are the outcome of the annual performance assessment process, which acknowledge performance excellence by awarding promotions. The results also allow employees to be identified who have the attributes to assume higher positions and responsibilities.
- b. **Compensation policies:** These policies help in the performance assessment process to make fair decisions based on the results of staff performance with regard to giving them all types of annual increments and bonuses.
- c. **Training policies:** Business organizations should adopt a plan to address their staffs' training needs in order to improve their performance and avoid weaknesses.
- d. **Recruitment selection policies:** These policies are used to provide objective and scientific performance assessments that enable an organization to determine the qualities, qualifications, and performance levels required to perform tasks effectively and efficiently; this helps with the selection of candidates to fill vacancies smoothly and fairly.

This discussion indicates that the objectives of performance assessment process are many and various. The literature also reflects the diversity of researchers' views regarding the assessment process. Despite this diversity, they are consistent and in agreement about the objectives of the various assessments. The researcher believes that it is possible to present these objectives in a simplified manner as in Figure 3.1.

### **3.10 Performance assessment steps**

The performance assessment process is considered as one of the essential tools in measuring all factors and aspects related to effective performance, to highlight the contribution of staff in production. It includes a series of steps or actions designed to measure the performance of each employee. Despite some differences in the steps taken to assess the performance of staff, the general framework of the process is as follows:

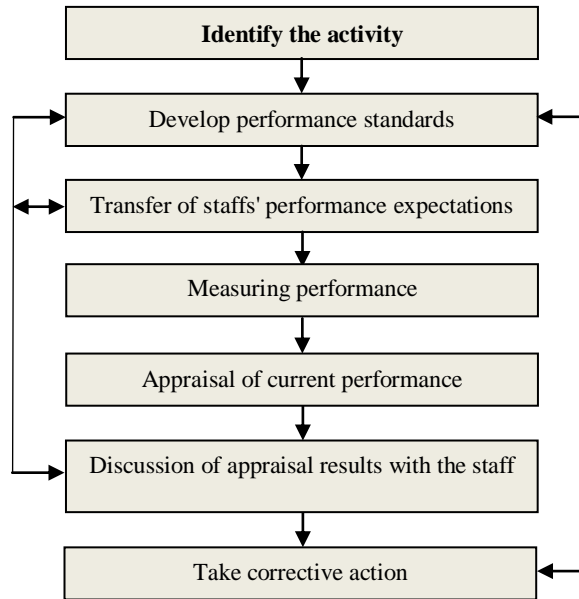


Figure 3.4: The seven steps of business organization performance assessment

In the next sections, the researcher discusses each of these steps.

### 3.10.1 Step one: Identify the activity to be assessed

Senior and executive management need to identify activities, processes and results of the actual implementation of strategies, policies, plans and programs to be monitored and assessed. The focus here should be on the most important elements of each activity subjected to measurement, since the implementation of the organization's mission, goals and objectives requires doing a number of integrated activities. Performance goals must be identified and the focus should be on the most significant elements of each process. The elements must be measured consistently and objectively, before performance standards are developed [132].

### 3.10.2 Step two: Develop performance standards

The performance standards are intended to provide a basis on which an individual's performance is assessed. This is important in order to ascertain the level of performance and whether or not it is satisfactory, or better; performance standards can be applied to both individuals and systems [133].

Performance standards define the expected results of staff's performance of a job. Identifying these standards is essential for the success of the performance assessment process as it constitutes the basic core for the persons concerned, particularly staff and their superiors [114]. These standards help to orient staff in terms of what is required of them; they also direct the manager and the supervisor to areas requiring improvement. Therefore, performance standards should not be formulated in ambiguous terms and staff should participate in preparing them since this ownership of the process will encourage loyalty and commitment to the organization [125, 134]. Based on organization's mission, goals and objectives, standards are established to be used in measuring the level specified by management as a model for performance assessment. Standards are used as points against which actual performance can be compared, and can be expressed in the planned objectives to be achieved within a specific period of time. Performance standards reflect the details of strategic objectives and the extent to which they are being achieved. The standards must contain limits to allow expected deviations within these limits [132].

### **3.10.2.1 Standards for effective assessment**

Wiesenberg [135] argues that there are three standards in order to obtain useful and effective assessment: implemented by the best and most efficient assessment experts; implemented in the least time possible, and implemented with minimum cost and effort.

### **3.10.2.2 Terms pertaining to performance standards**

There are several conditions that characterize good standards and make them suitable for judging performance. [132] They are as follows:

1. **Realism:** The standard must be achievable and not beyond the realms of possibility; otherwise it leads to lack of motivation to improve and lowers staff morale [132].
2. **Activity engagement:** The standard which is not related to an activity is a worthless standard.
3. **Accuracy:** The standard must be specified carefully and clearly so as not to become subject to misinterpretation by people who are being assessed or those administer performance measurement or assessment.

4. **Flexibility:** The process of setting standards does not mean that management should be committed regardless of changing circumstances; the standard should be changed as circumstances change.
5. **The number of standards should be reasonable:** Setting too many standards might complicate the regulatory process; also, there is a risk that some of the standards will be ignored.
6. **Reliability:** Consistency is related to the standard, not the performance, because an individual's performance can change or fluctuate.
7. **To be practical:** The scale must be easy to use, clear, not too time consuming, and should require little effort.

Other researchers focus on the same factors discussed above, but in a different way. For example, some researchers [136-138] argue that specifications or other conditions must be available in performance standards. The discussion of the factors is as follows:

- a. **Reliability:** This is the possibility of achieving stability and consistency. Stability implies that the standard measurements taken at different times produce almost the same results. While compatibility indicates that the measurements of the standard acquired from different individuals by different methods produces close results regardless of the individuals or methods used.
- b. **Discrimination:** One of the main aims of performance management is to have objective assessment. A good standard should distinguish between individuals only according to their performance. This is important for the purpose of using the results of this assessment to set wages and salaries, to promote individuals, and to identify the appropriate training and development programs required.
- c. **Acceptance:** The standards used for performance assessment should be accepted by individual employees, since the accepted standards should be fair and should reflect the actual performance of the staff. This study believes that the performance assessment process should include, in addition to the above, "reliability of assessment and safety of its procedures," which usually stems from the use of objective and specific performance standards, which protects employees from bias and personal opinion. Usually, two types are measured: the elements, and the rates of performance [121, 139]:



### 3.10.2.2.1 The elements

This factor pertains to the qualities and attributes that are desirable in the employee and which are reflected in his work and behavior; these include: ability to perform work tasks successfully and efficiently, and loyalty, dedication, honesty, cooperation, and diligence. These characteristics fall into two categories:

- **First:** an individual's tangible dimensions at work that can be easily measured, such as persistence with tasks and accuracy.
- **Second:** the intangible dimensions in the workplace including personality (intelligence, honesty, cooperation, empathy, etc...). The assessor needs to be constantly aware of these dimensions. The researcher believes that the most important conditions to be met in the elements are as follows:
  - a. Generality: the element should be general and comprehensive and therefore applicable to a large number of staff, available to most of the staff, and not limited to a minority only. Some of the elements are sincerity, honesty, and consistency of work practices. These elements must be available to most staff in the facility and are necessary to measure and assess their performance.
  - b. Definition of elements: this is important to clarify what is intended by each element. Having a good and clear definition of an element enables it to be recognized and distinguished from the rest, in terms of label or meaning which helps to obtain sound results.
  - c. The ability to recognize the element and measure the extent to which it is demonstrated by an individual: it is necessary that the attributes be easily observed, in order to facilitate the task of the assessor, and not require considerable time and effort to be measured. Therefore, attributes such as emotional stability and psychological serenity that cannot be easily measured, should be omitted since these need the expertise of a psychologist.
  - d. The elements should show the factors and effects related to success or failure of each task, and the duties and responsibilities that an employee must meet in order for the work to be performed efficiently.

### **3.10.2.2.2 Performance rates**

The rates of performance can be defined as a scale by means of which the assessor can measure the productivity of an employee to determine his efficiency at work in terms of quality and quantity achieved within a specified period of time. This is done by comparing the finished task with the specified rates in order to finally determine his level of productivity in terms of quantity or quality [140]. Some researchers note that there are three types of performance rates, as follows [140, 141]:

- 1. Quantity rates:** These rates specify a quantity of production units that must be produced within a specified time, that is, they indicate the relationship between the amount of product and time associated with this performance.
- 2. Quality rates:** These rates mean that an individual must achieve a certain level of productivity, quality, precision and perfection, and often a certain allowable percentage of mistakes or defective production is specified and should not be exceeded by the individual.
- 3. Quantity and quality rates:** These rates are a mixture of the first and second types, through which individual's production should reach a certain number of units during a specified period of time and with a certain level of quality and perfection.

In order to have performance rates valid for correct and accurate measurement, they must be reasonable, acceptable and represent average performance so as not to be too low nor too high, and must be reviewed periodically due to changes that occur in the workplace (provide flexibility) [140, 142]. Catano [119] argues that the measurement and assessment of effective performance requires a combination of elements and rates together as much as possible, in order to produce accurate and detailed results regarding actual performance.

### **3.10.3 Step three: Transfer of staff members' performance expectations**

After specifying the required standards for effective and successful performance, staff members should know what they should do, and what is expected of them. It is better for the communication process to be two-way: the information is transferred from the staff to their managers and vice versa; it should be discussed and understood by staff. Staff should be encouraged to seek clarification from managers regarding anything that is not fully

understood. Cook and Crossman [143] argue that discussing the assessment standards with staff contributes significantly to making the performance assessment process successful.

It is also desirable that senior staff meet with their subordinates in order to discuss the objectives that they are expected to achieve, which may be either short- or long-term objectives and are linked to a department's or organization's objectives. Senior staff should also determine the main capacities of the job, and then use them to determine future performance objectives [144]. This phase requires also the negotiation of new agreed performance targets between the staff and the supervisor and must be reviewed regularly and adjusted as needed. Chen [145] also argues that, before implementing the performance assessment process, the superior should discuss with his staff the method used in the process, its objectives, and the elements that will focus on the benefits expected to be obtained, and their impact on the future of the staff.

#### **3.10.4 Step four: Measuring performance**

This step is done by collecting information about the actual performance. This information can be obtained from four sources [146, 147]:

1. Personal observation.
2. Statistical reports.
3. Oral reports.
4. Written reports.

Each of these sources has its own strengths and weakness. For example, oral reports cannot be documented, and personal observation can be subject to personal biases, and needs a lot of time to complete. However, it is possible, through statistical reports, to show relationships between variables related to performance, and make it more comprehensive and formal by preparing written reports. Therefore, using a combination of the mentioned sources can increase the likelihood of obtaining better reliable information.

After selecting the standards that will measure the objectives, performance is measured. The purpose of performance measurement is to gather information about the actual performance of an employee in executing tasks. Measuring the actual performance in general should include both quantitative and qualitative aspects, since the measurement of a performance

standard consists of a number and a measurement unit. The number shows the quantitative aspect, while the unit of measurement gives the number a certain meaning. Performance standards can be represented in units [132] such as hours, meters, number of reports, number of mistakes, number of qualified staff, and so on, where these standards can show deviation in the process or in design specifications [147].

### **3.10.5 Step Five: Comparing the actual performance with the established standards (assessment of current performance)**

In this step, actual performance is compared (measured in step four) with the desired performance to determine whether there is a match or a difference between them, and whether or not this difference is acceptable. By comparing the actual performance with the desired performance, any discrepancy between them can be identified, and steps can be taken to try to rectify this by examining any internal and external changes in the organization. So, this step is intended to identify the difference between the actual and the planned performance, and determine whether this difference is negligible or requires rectification. The comparison is based on the performance results [132].

### **3.10.6 Step six: Discussing assessment results with staff**

It is not enough to acquaint employees with the results of their performance assessment; it is essential that the assessor or immediate supervisor discuss with the employee all of the positive and negative aspects of the assessment to clarify some important aspects that may not be perceived by the staff, particularly any negative aspects in the staff's performance. Furthermore, the discussion and the feedback soften the impact of any negative results. It also helps the staff to recognize the strengths and weaknesses of his performance, and work on developing his strengths, and address weaknesses in the future [143]. The researcher argues that there are, in the developing countries, still many managers who hesitate to discuss the results of performance assessment with staff. As a result, this will negatively impact on work relations, and thus on the performance of the staff, or positively, i.e., objectively points out the aspects of performance proficiency, which must occur in open discussions between the manager and the subordinate.

### **3.10.7 Step seven: Taking corrective action**

The last step in the process of strategic monitoring has two options:

1. Match the actual performance with the planned performance, where the monitoring process continues.
2. Presence of deviation from the planned performance, where corrective actions should be taken.

When there is deviation in performance, corrective actions must be taken by diagnosing its various aspects and searching for the causes of the deviation. Is the deviation by chance, or as a result of an error in applying the operations? After detecting the causes of deviation from the expected outcome, these need to be addressed and corrected; this also enables the organization to set realistic objectives by amending the objectives or methods [132]. There are two types of corrective action: the first is direct and fast; there is no attempt to search for the causes of the deviation; there is only an attempt to modify the performance to match the standard. Therefore, this type of correction is temporal. The second type of corrective action for performance is the basic search for reasons and manner of deviation occurrence, so that analysis is made of every aspect of deviations in order to ascertain the reasons for them. This type of corrective action is more in-depth and more logical than the first method. It also has a strategic view in the long term for the business organization [148]. Managerial decisions resulting from performance usually take on many forms: assess the policy of selection, training, transfer, termination, job rehabilitation, promotion... etc. Action plans may also be developed to address performance or problems and identify the nature of the problem. They also define steps to be taken by both the staff and the supervisor to cooperate in solving the problem, and the time required to implement the plan [144], and the manager, at this point, has to define the possible aspects of development. These aspects might be determined in one or more of the business requirements, such as: the technical aspect, performance and cooperative behavior with colleagues or superiors (work relations), upgrading of communication efficiency, problem solving, and decision-making [148]. In addition to the above aspects, both timing and task organization and prioritization could also be considered [149].

### **3.11 Methods of performance measurement**

As noted in the previous steps, performance measurement is considered essential in strategic monitoring, since the gathered data indicates the actual performance of activity or individuals. There are several methods which enable us to effectively gather information for use in the assessment of this performance and take corrective action [150]. These are as follows:

#### **3.11.1 Traditional financial performance standards**

Several standards of financial performance are used by many business organizations to express their objectives and financial results such as sales, Earnings Per Share (EPS), Return On Investment (ROI), Return On Assets (ROA), Return On Equity (ROE) and Return On Sales (ROS). However, these accounting standards of performance have been exposed to many criticisms since they are based on historical accounting values [128, 151]. Some of the significant criticisms of the traditional financial standards are [119, 147] as follows:

1. Traditional financial standards are historical in nature and therefore the decisions based on them may not be rational since they rely on possibly outdated information.
2. The traditional financial standards are characterized as very slow in facing competitive business organizations in the rapid and volatile movement for market products.
3. The traditional financial standards reflect past performance, and therefore cannot assess future performance. Therefore, these standards do not reflect the future trend of business organizations.
4. Traditional financial performance standards encourage a focus on achieving short-term results at the expense of achieving long-term results.
5. Traditional financial standards of performance provide insufficient or inaccurate information they cannot be relied upon when making strategic decisions, i.e., performance standards may provide misleading information about the level of performance, which leads to making wrong decisions.
6. Traditional financial standards for performance are one-dimensional not multi-dimensional, as they focus on the financial performance only, without focusing on

many other dimensions such as relationships with customers, internal operations, and processes of education and growth.

7. There is an unclear relationship between performance results and the causes of performance results.

### **3.11.2 Non-financial performance standards**

#### **3.11.2.1 Quality standards**

Quality has become the primary focus of organizations, a management philosophy and culture that enables an organization to obtain the competitive advantage which is needed to survive in an environment of rapidly changing variables. Quality is fundamentally based on the consistent delivery of exceptional performance in terms of goods and services and results in improved productivity, increased demand, lower costs and minimal product defect. Many standards are used to measure quality performance, mainly customer satisfaction, quality of production standards... etc[147].

#### **3.11.2.2 In-time production standards “Just In Time (JIT)”**

Management usually requires the business organization to produce goods or services as quickly as possible and at the lowest possible cost through the constant recognition and scaling of all of the causes of losses and deviations from the planned standards for quality, cost and time. This requires the reduction of inventory and improvement of scheduling and the quality of operations and products, in order to improve relations with suppliers. That is, the main objective is to achieve higher savings and raise operational efficiency by reducing the duration and cost of the elapsed time from when the product is ordered to the time of its delivery to the customer [152].

#### **3.11.2.3 Measures of delivery performance**

To maintain an adequate level of customer satisfaction, goods must be delivered on time and in the desired condition. The speed with which service can be delivered is an intrinsic factor determining whether or not a business organization survives in the modern manufacturing environment. Hence, a business organization which can quickly identify and meet the needs

of clients is likely to be more successful and stable in the marketplace. Delivery performance measures are used in order to achieve “higher levels” of product delivery and service performance [153].

#### **3.11.2.4 Research and development measures**

The research and development process denotes the scientific and research efforts that could ultimately lead to the improvement and innovation in the output of the business organization. The research and development process is intended to reduce costs, increase financial returns and enable the business organizations to keep abreast of recent developments in all areas. This gives business organizations a competitive advantage [154] since standards for research and development ensure survival and continuity. These measures include determining the proportion of change in the output to the change in input, and the output is divided by the investment in research and development.

#### **3.11.2.5 Measures of cost**

The process of cost management needs strategic approaches which provide a deeper understanding of costs, and target cost according to the business organization's cost dynamic activities. Hence, an in-depth analysis and study is needed of the cost factors in the business organization, in order to improve its strategic position of and competitiveness, since cost management means controlling the costs from the outset [155]. As a result of that, production staff became the key in controlling cost elements. Thus, the traditional performance assessment systems which were suitable before the dramatic changes in the business environment, have become inappropriate for performance assessment; hence the need for assessment systems for the strategic performance [147].

### **3.12 Performance measures' development trends**

Johnson and Kaplan [156] noted that there are three key reasons for the failure of traditional financial indicators in management accounting:

1. **Utilization:** there is a failure in using flexible budgets to assess the fixed discretionary expenses or in using appropriate measures for monitoring fixed costs.



2. **Consistency:** there is a lack of measures that develop control of quality, factor of quality, factor of productivity, or in shading light on the alternative opportunity cost.
3. **Monitoring:** there is failure to acknowledge the non-financial factors, instead focusing on the short-term financial performance indicators and the financial accounting considerations in cost accounting.

As a result, it became important to search for non-financial indicators that represent measures to improve and develop the outcomes of decisions as a result of information derived from management accounting, and facilitate the process of assessment and control. The framework proposed by Kaplan [157] provides non-financial indicators that cover four areas of the organization's performance, namely: products, markets, staff, customers. This framework illustrates that the focus of performance measurement has shifted from financial measurement to non-financial indicators, although some believe that there is no study that determines the cause of the evolution of performance measurement in this way [158]. Cross and Lynch [159] suggested a system to measure performance objectives that links the strategic and operational objectives and integrates the financial and non-financial indicators, creating a pyramid of performance. In the previous sections, performance was discussed generally in terms of its several aspects. To supplement the subject of this study, the following sections present a discussion of IS performance in all of its forms and levels in business organizations. This will emphasize, in some cases, the related AIS systems in this study.

### **3.13 Performance assessment IS**

In the era of accelerated changes and severe competition, the role of IS in business organizations is increasing. IS constitutes an integrated concept comprising many elements including devices, computers, packages of different forms, individuals of experts and workers, procedures, data bases, and various types of data.

This combination of components gives a real picture of the nature of IS in business organizations, where it plays two major roles. The first role is to provide stakeholders with the necessary information in order to make appropriate decisions. The second role is to provide periodical and routine reports necessary for work progress [160]. Thus, IS has become the repository of an organization's resources, i.e., hardware, software, human

resources, integrated management and technical capabilities. Consequently, this facilitates an organization's performance, and provides the ability to obtain, organize and process information as required by using IS functions related to an organization's performance [161]. The following figure illustrates this relationship.

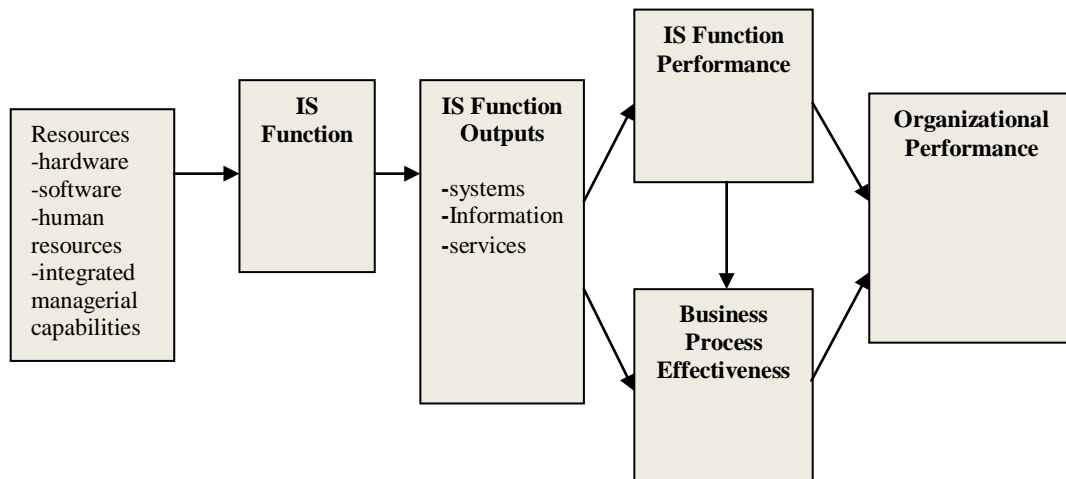


Figure 3.5: Input-Output Performance Model [162]

The above figure shows that IS requires a technological environment with an infrastructure comprising material resources, developed programmers, qualified and trained personnel to use such resources and programmers, thereby increasing the performance of IS. Since IS contributes to the improvement of business organizations' performance, its effectiveness can be ascertained by this performance [162, 163].

### 3.13.1 Changing IS Function

In the last few years, there has been a change in IS functions as a result of the change in the business environment. Previously, IS focused on increasing the efficiency and effectiveness of an organization's performance through programmers, networks and computers, in order to improve service and production. Later on, its role was to manage information resources to support management decisions through timely communication of information to its users. After the vast spread of IT, IS made a significant impact on the performance of all the operations of a business organization. It determines organization's growth, strategies and goals. Since IS is part of an integrated system, with outputs that represent the achievements

of the organization, it is necessary to measure an organization's performance and its effectiveness according to various dimensions and measures that show the effectiveness of all elements [162].

### **3.13.2 Designing an effective IS performance assessment**

Some researchers in IS design and performance application, emphasized that business organizations should be aware of how to create, design and manage their IS performance, in order to have an efficient and effective IS for performance assessment. They emphasized the necessity of assessing IS itself, which is used to assess the performance of other tasks in the business organization since it is necessary to assess all types of systems and verify their validity or improve their performance, before being used to assess other jobs. Hence, the process of designing an effective IS performance system requires the following [164, 165]:

1. developing clearly articulated IS standards;
2. ensuring that users know how to apply performance assessment systems, especially AIS;
3. providing specific systems that allow staff who are not satisfied with an organization's performance to simply submit their objections;
4. emphasizing the significance of the relationship between the integrated performance assessment systems in the performance assessment systems on one hand, and staff management and organization on the other since staff are the key to an organization's success in business environment; and
5. providing open communication channels between staff. In order to guarantee effectiveness, interviews should be adopted to assess IS performance.

Designing an effective performance assessment system for business organizations increases their staff motivation and commitment [166, 167]. This can be achieved by analyzing the relationship of the group of factors that influence the effectiveness of systems' performance assessment, namely:

1. Developing an effective performance assessment system requires top management's support, which refers to:
  - a. Proper application of the system, which requires management's support.

- b. The employees must have the appropriate skills such as complete awareness of the system's mechanism, communication skills, and skills to solve problems during assessment or system's work procedures.
  - c. Employees' awareness of the significance of the assessment process should be clarified, together with an understanding of its purpose, and the results expected of assessment operations conducted or processed by the system.
2. Decrease system's effectiveness in case of linkage between staff performance and the goals of the organization.
  3. Participation of all levels of employees in defining the goals of the organization.
  4. The existence of performance criteria to measure an organization's goals.
  5. The provision of supporting programmers that help employees during the assessment process.

### **3.13.3 IS Performance Measures**

Despite the role that IS plays as an integrated and significant part of a business organization's strategy to achieve its goals, there is not enough attention given to the methods used to measure performance. This is the result of a variety of measurements, and the perspectives used to measure performance properly [168]. Generally, most researchers in the previous studies referred to various measures such as service performance, system performance, information effectiveness, strategies and control. But there are not enough studies that propose the tool and the unified perspectives for measuring IS performance. This indicates that there are doubts about whether there is a positive relationship between IS performance, regardless of its type, and an organization's performance one way or the other. This points to the need to conduct further studies in order to produce a comprehensive framework that clarifies the nature of such relationship and to develop a tool to measure the effect or significance of this process in improving the performance of both a system and an organization [162]. Researchers [169] have established many indicators to measure IS effectiveness, some of them quantitative, such as a system's contribution to increasing profits and market share. Some other indicators were qualitative, such as the satisfaction of the end user and volume of use. The use of some methods and indicators to measure IS effectiveness might be feasible for one organization. But, it might be difficult to achieve the same results when the study is applied to more than one organization, since each organization has

different indicators. Therefore, there is no specific method that can be adopted as a standard to measure IS effectiveness. Thus, [170, 171] defined three perspectives from which IS can be measured:

- 1. The extent of scope to be measured:** This is applied solely to a specific programmer to measure its system's effectiveness. It might extend to cover several applications of the same programmer or several programmers, i.e., determine the level of application, and measure its effectiveness.
- 2. Measurement:** Represents types of information to be collected, method of collection and its interpretation. Information is gathered either through direct observation of work variables, or through a questionnaire, and quantitative methods to measure benefits. Consequently, an effective IS increases a business organization's performance resulting from IS support.
- 3. Organizational paradigm:** Since a business organization has various activities such as production, marketing and staff, finance, etc., whenever such elements are managed rationally, an organization's performance improves. However, when activities are not reasonably well-managed, performance decreases, usually as a result of the imprecision of information made available for each activity. Also, if personal priorities are given preference over those of the organization, this creates varying degrees of conflict between managers, staff and stakeholders, thereby affecting the measurement of IS.

The previous studies of IS assessment focus on transactions' systems and production, where popular measurements were used, such as: circulation average, profitability, productivity, timely deliverability, and rates of cost and saving. These measures, in addition to others, such as return on assets or return on investment, are used to combine IS quantitative data of financial effect and its operational effectiveness. Systems related to the previous operations' performance, especially AIS, place the same emphasis on the various levels of service, in addition to their significance in realizing benefits by assessing the system's effectiveness. They also contribute to decision making and the creation of additional value for business organizations. Therefore, in the next section, the researcher will discuss AIS as any other IS in business organizations, since they have in common the function mechanism and assessment mechanism referred to in this section.

### **3.14 AIS Performance and factors affecting its measurement**

AIS, as defined by Willcocks [172], "started to increase in application for strategic reasons, such as enabling and improving responsibilities through e-commerce. Also, improving efficiency and control on internal operations of the expected productivity and improving failure in return". It is difficult, to some extent, to thoroughly discuss the factors that affect AIS performance from the perspective of the known IS terms [29, 172]. This is clearly obvious upon assessing its effect on business organizations in terms of outputs, stakeholders' satisfaction, or reviewing the financial situation from a narrow perspective. Andreas [64] argues that an efficient AIS is a system designed to study all factors affecting it as an information system on one hand, and to consider the factors affecting the financial data as a financial system on the other. Since large organizations require integral processing of information, they need to have efficient AIS in light of competition and diversity of information capacities in high competence markets [173]. Hence, organizations have to search for the best methods to achieve the target results, focus on major goals, take care of technology, view things from the stakeholders' perspective, eliminate old-fashioned attitudes, and anticipate that employees will process all of the financial operations. Finally, Choe [77] proved that there is a relationship between factors affecting AIS performance and IS level of development in business organizations. Thus, in order for AIS to achieve its goals in business organizations, attention should be given to all the various affecting factors, in accordance with IS development level in the organization.

### **3.15 Conclusion**

Performance measurement is undoubtedly a fundamental strategic management process, and is similar to any other management process, such as decision making and team building, etc. Therefore, it is one of the major issues for any organization to consider for achieving different successes in specific aspects. There is a relationship between establishing work plans and setting up performance measures in business organizations. Since such measures are considered as a work plan for future target goals. Hence, the concerned staff is expected to measure performance in a method suitable to their organization's nature of business in order to accurately determine the achievable goals. Performance assessment defines the know-how to perform organizations' work and often to set up a plan to improve and develop their performance. When performance assessment is applied properly, it clarifies

organization's current performance level, might affect organization's capacity level trends of future tasks and support efforts to improve performance properly.

Information systems are highly advantageous not only for decision-making processes, but also for other management processes such as planning, policy making, control, and performance assessment. The use of information systems for performance assessment is both most attractive and significant. Performance assessment is one of the basic management processes, and one of the critical issues when contemplating and planning for development processes in any organization. By considering performance, top management can design and prepare development programmes that suit an organization's circumstances, needs and actual capacities. Without performance status assessment, it is difficult to prepare suitable plans and programmes.

# **Chapter 4 - Balanced Scorecard (BSC) Strategy as a Performance Improvement Tool for Accounting Information Systems**

## **4.1 Introduction**

In Chapter 1, the AIS and its development strategies were discussed, while its definition was discussed in Chapter 2. Chapter 3 discussed the mechanism of performance assessment in business organizations in general. This chapter aims to clarify and disambiguate the meaning of strategy, which was discussed in the previous chapters, and link it with the mechanism of AIS performance assessment. Results of studies that attempted to test the relationship between AIS performance in business organizations and adopting strategic planning denoted a positive relationship between them. Those studies demonstrated that the performance of strategically-managed business organizations is higher than those which are not strategically managed. In other words, this chapter continues in the logical sequence to build this study's plan in detail. In addition, it helps to link the major objective of this study, which is to improve AIS performance with its related strategies. Also, it discusses the appropriateness of strategies which will be adopted later to establish the study's methodology, in order to determine the characteristics of the balanced scorecard (tool of the study), show how it can be developed and its appropriateness to achieving the study's goal, as shown in Figure 4.1.



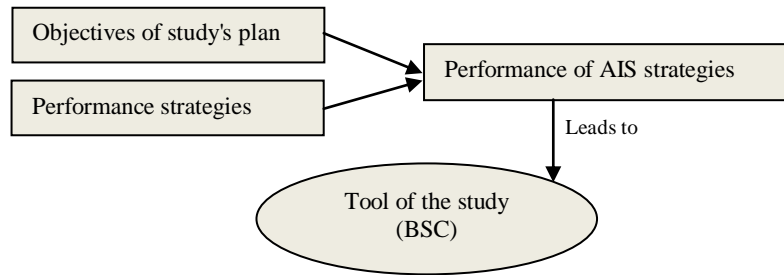


Figure 4.1: Linking the objectives of study's plan with AIS Strategies

Based on that, in Sections 4.2-4.6 of this this chapter, the researcher discusses the meaning of strategy and strategic accounting, and presents an overview of the different opinions from the literature which deal with the significance of strategy in developing AIS performance in business organizations. The researcher also quantifies the dimensions and types of strategy, and conducts an analysis of the main trends that link accounting with strategy. Then in Sections 4.7-4.14, the researcher discusses the balanced scorecard as a comprehensive system to measure performance and the motives for developing this tool, its benefits, significance, and four core perspectives. Also, there is a discussion of its basic roles, its perspectives and relations between them, its methodological steps in the design and implementation of a BSC. In Sections 4.15-4.16, the researcher discusses the Bank AIS's comprehensive performance in accordance with the BSC. Finally, the researcher links this to its uses and strategic planning in Jordanian banks.

## 4.2 Definitions of strategy

In the literature, strategy has been defined in different ways by different researchers. For example, Thompson [174] defined strategy as “an integrated combination of competitive trade moves and trends employed by managers to satisfy customers and compete successfully to achieve the goal of the business organization”. Johnsen [175] defined strategy as: “a comprehensive major plan which presents how the organization will achieve its mission and objectives maximizing the competitive advantage and minimizing the competitive risk”. Mintzberg [176] regards strategy as: “the organization's vision about the nature of the expected relationship between the organization and the external environment”. Based on this definition, strategy determines the quality and nature of work that will be undertaken in the long term. Also, having a strategy determines how long the organization

will take to achieve its goals and objectives. Mintzberg also pointed out that the short-term plans are concerned with efficiency, while strategy is concerned with effectiveness issues. Porter [177] criticized this viewpoint, and argues that the differentiation between strategy and the short-term plan is not always clear. This is because what could represent a strategy for a business organization might be a short-term plan for another, and if the time factor is considered, the short-term decision taken now might become a strategic trait in the future. This was affirmed by Chandler [178] who defined strategy as: “an organized identification of organization's goals and objectives on the long term and the allocation of resources set to achieve these goals and objectives”. More broadly, strategy could be defined as: “a comprehensive full plan with an extended time horizon, containing a set of short-term interim operational plans; and seeks to achieve some identified general goals within the variables of internal and external environments and their components” [177, 179]. Another definition of strategy is: a comprehensive master plan that presents how the organization will achieve its mission and objectives, trying to maximize benefits and minimize competitive risks [180]. Porter [179] also confirms that strategy is the creation of harmony among the activities of the organization and the adaptation to the environment. Thus, in the absence of harmonized activities, there will be no successful and distinct strategy.

The researcher believes that the features of strategy can encompass elements of all the previous definitions. Since strategy focuses on long-term achievements, it is concerned with the future of an organization and is intended to improve the company's competitive position. This is done by creating a sustainable competitive feature for the organization, emphasizing the importance of the marketing function and analysis of the surrounding environment. To the same extent that the word ‘strategy’ and its difficulties have been explained and debated in the literature, accounting literature includes similar debates regarding the definition of “strategic accounting”. This is discussed in the next section.

#### **4.2.1 Definition of strategic management accounting**

Strategic management accounting is defined as the development of a total management accounting system intended to provide accounting information that might make substantial improvements in goals, operations, production, services or the environmental relations of the business organization. It aims to achieve an organization's strategy in competence,

operations, decision making, etc. There are three opinions in the accounting literature regarding this term, as follows:

**First:** The first opinion uses the term 'strategic accounting' to refer to the total developments occurring in the field of management accounting as a synonym for accounting in order to achieve a strategic situation. They consider it as a complement to a series of subjects that include cost accounting and management accounting. They believe that it aims to provide accounting information that supports the achievement of an organization's sustainable competitive advantage. They also affirm that the strategic management accounting means taking away from accounting the previous emphasis on the historical internal information and emphasizing instead future external factors especially those relating to competitors, clients and the external environment [20, 181].

**Second:** This opinion uses this term to refer to attempts to merge strategy literature with management accounting into a framework of strategic management accounting. This is the most commonly-held view of what constitutes strategic management accounting [182, 183]. The researcher believes that this opinion does not greatly differ from the first opinion, since the changes that have occurred in management accounting have resulted from the attempt to introduce new and innovative accounting methods that provide information that support organizations' strategic management.

**Third:** This opinion defines strategic accounting on the basis of initial writings by Simmonds [184, 185], followed by Bromwich [186]. Both consistently used the term 'strategic accounting' to mean an accounting approach that is responsible for providing accounting information for management. This is intended to support strategic management. Simmonds is considered as the first to use strategic management accounting on a group of activities and recommended it to be added to management accounting. He stated that the purpose of strategic management accounting was to "Provide and analyze management accounting data of the organization and its competitors in order to be used in formulating and monitoring business strategy". Simmonds argued that management accountants are best able to perform such activities since they have the skills and concepts that enable them to explain to top management any changes in the organization's competitive position. He also affirmed that in order for the accountants to undertake such activities, they have to develop what they actually have of instruments and to learn how to obtain competitors' information. Furthermore, he added that the management accountant can employ balanced equivalence analysis by applying the available information to competitors.

Before the link between strategy and accounting is examined, an in-depth discussion of the dimensions of strategy is provided in the next section.

### **4.3 Strategic accounting in literature review**

In the literature, some researchers question the capacity of accounting information to serve management purposes [187-189]. Therefore, many attempts have been made to develop accounting and accounting information to match the new management requirements. The most significant of these attempts were those who sought to link accounting with business strategy within the framework of accounting strategy. Meanwhile, a debate emerged regarding the usefulness of accounting and accounting information. Kaplan [190] declared his reservations about the lack of developments in the accounting field, and assumed that accounting reached its peak in 1925, then started to lose its significance and accounting information started to become unsuitable. He called for a development of accounting systems in order to provide information that suits the developed management purposes, which are affected by the accelerated changes in the external environment of business organizations. This was accompanied by the complexity of the business environment, and the increase and expansion of competition. Also, there was a call to change the role of the accountant, in order to achieve a sustainable competitive advantage. At the same time, many attempts were made to link accounting developments with strategy. Some called these attempts 'strategic accounting', while others called them 'accounting for strategic positioning'. However, accounting literature does not offer a specific, generally agreed upon, definition of strategic accounting. This section discusses the concept of strategic accounting on the basis of being the field that shows how strategy methods reflect on information the accounting system seeks to provide. This will be discussed in following section.

### **4.4 Significance of strategy in developing AIS performance in business organizations**

In the recent few years, numerous ISs have been used in business organizations, which resulted in the failure of the traditional planning systems and methods to predict and analyze the historical incidents. Such mechanisms became unable to face future challenges and adapt to successive international changes. Strategy provided a compass that directed business organizations and determined the appropriate direction to follow. Strategic planning became very common practice among contemporary business organizations of various types and

engaged in different activities. Practical experiments related to strategic planning proved that the organizations which used strategic planning excelled in their overall performance. Strategic planning included IS, notably AIS, in business organizations, similar to other activities that require building their own strategies. Its fundamental principles, methods and theories have been developed with a blend of practical field experience and the specialized methodology. This was adopted in order to fully and effectively exploits the available capacities of such systems, based on strategy as a proficient method to ensure that the performance of such systems fully achieved their goals. On the other hand, AIS based on strategy basically assists in improving business organization's achievement of goals regarding products, services, internal and external operations, since IS and strategies are used in all the activities of organizations. For example, AIS covers several fields of a business organization's activities, thus, it may totally change an organization's function. This confirms the significance of AIS as a factor that requires strategies, which is considered as one of the most critical strategies for business organizations since it includes financial and non-financial issues at the same time. With the emergence of AIS strategy as one of the planning forms in organizations, this type of planning resulted in changing the manner of an organizations' planning I order to setup and implement their own strategies. AIS strategy became a basic tool that organizations needed to learn and develop in order to distinguish themselves among competitors and keep up with rapid and increasing international changes. Thus, AIS strategy is having a significant dimension in observing organizations' future performance, and predicting challenges that might face. Since this strategy is considered as a fruit of strategic planning concept's development of IS. Therefore, AIS strategy became as one of the significant elements for contemporary business organizations' strategies.

## **4.5 Dimensions of strategy**

Because of the various definitions of strategy, it is not easy to provide a common definition for the term. It seems that the best way to understand its meaning is to know the key dimensions that make up the strategy of an organization. No matter how strategy is defined, it must include the following key dimensions cited in Arnold [191]:

1. Strategy presents a unified general framework based on which decisions can be made. Such decisions shall be harmonious and complementary. This dimension stems by the definition of the premise that strategy is the driving force in the firm to

develop plans and then implement, in order to achieve established goals and objectives.

2. Strategy is a tool which determines the objectives of the organization, in terms of long-term goals, action plans, priorities and resource allocation. In this dimension, strategy is seen as a means of shaping the long-term goals and objectives of the organization. It is also seen as an identification of the activities required to achieve these goals, and the required resources, then providing these needed resources.
3. Strategy presents a definition of the competing business area, and requires identification of the organization's work with special exposure to the issues related to its growth and the expansion of its business and diversity. In this context, strategy seeks to answer two fundamental questions: What are the organization's fields of work now? And what are the fields of work that must be launched in the future?
4. Strategy is considered a way to decide how to respond to the external opportunities and threats and to the internal strengths and weaknesses. This will guarantee the organization the achievement of superiority over the other competitive facilities. From this perspective, strategy aims to achieve continuous excellence of the facility over its competitors in all fields of work. This superiority is the result of a deep and comprehensive understanding of the internal and external forces affecting the facility.
5. Strategy is identification for the economic and non-economic contribution which the organization intends to offer to all its beneficiaries, including the owners, shareholders, employees, managers, its customers, and entities benefiting from its products or services... etc. The importance of this dimension stems from the need for the strategy to take into account a wider segment of beneficiaries. It also needs to avoid having a focus on achieving a quick profit as an incentive to work. Rather, it should take into account the best long term interest of all beneficiaries. The significance of this dimension, at the same time, stems from the need for the organization to take into account establishing a wider interest of the beneficiaries [192].

Therefore, the researcher's definition of strategy is "the comprehensive future plan set by the organization, identifying its goals, objectives and the means to achieve such objectives, taking into consideration the opportunities and constraints". This means that the strategy can be used as a plan for the short and long term for any business organisation.

### 4.5.1 Characteristics of strategic decisions

The strategic decisions are linked to strategic issues, such as their relationship to the process of building, creating and formulating the strategy, i.e., developing long-term plans for effective management of environmental opportunities and threats. This is from the perspective of the organization's strengths and weaknesses, and includes determining the business organization's mission and identifying the achievable goals [193]. Also, it includes the development of strategies and establishing policy guidelines and focus for the strategic decisions concerning where to invest the resources of the institution. Organizations would address questions such as: "In what area of business should we be more active?" Or: "What is the value of the resources that must be invested through the organization's business portfolio?" [194, 195] .

### 4.5.2 Types of strategies

There are several types of strategies in any business organization as shown in the Figure 4.2 [174, 175, 196, 197] below:

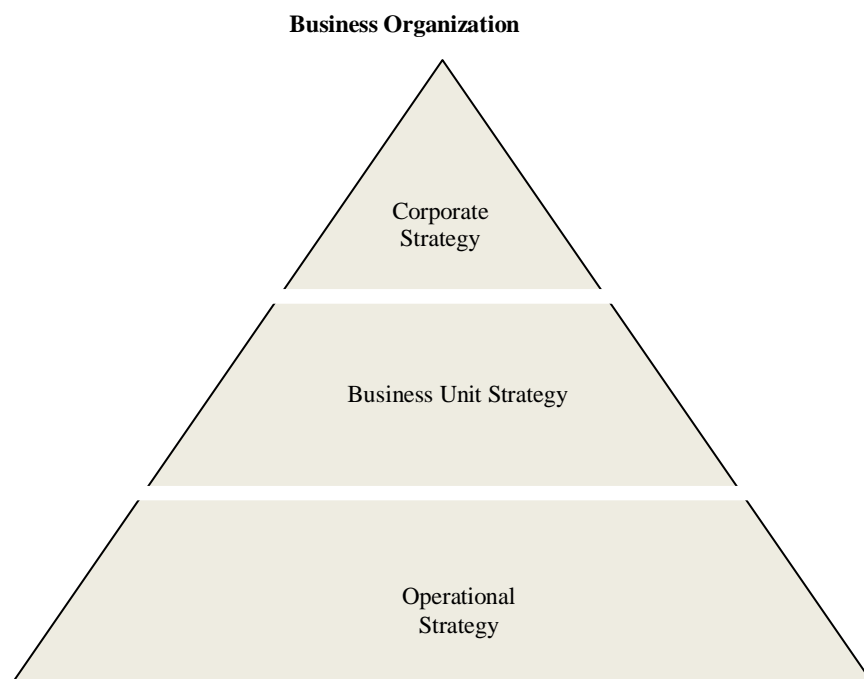


Figure 4.2: Types of strategies in a business organisation

#### **4.5.2.1 Enterprise-type strategy (Corporate Strategy)**

This strategy is concerned with achieving the overall objective of the organization. It determines the corporate mission in society and aims to identify the strategic objectives and decisions related to the organization. Furthermore, this strategy type aims at identifying the organization's share of the market, and determining the resources needed to accomplish the organization's activities. Finally, the executives, members of the board and directors are the administrators of this type of strategy.

#### **4.5.2.2 Strategy for business units**

This strategy is concerned with examining strategic business units and determining how to successfully compete within a given market. Business strategy is usually found in the business unit, and focuses on improving the competitive position of products or services of the organization, in a specific industry or sector of the market served by the work unit. The aim of the business unit strategy is to ensure the competitiveness of goods and services provided by the organization in the labour market.

#### **4.5.2.3 Operational strategies**

The scope of this strategy type is to focus on business and specific functions such as: individual jobs, finance, production, marketing and customer services. The main objective of the strategic practice at this level is to increase the effectiveness of the organization's performance to serve the objectives of the strategies that are developed at the senior and middle management levels. In the next section, the researcher discusses the trend of linking accounting with strategy.

### **4.6 Linking accounting with strategy**

When linking accounting with strategy, generally, the accounting literature emphasizes management accounting in order to produce strategic management accounting instruments and methods. Some authors attempted to link financial accounting with strategic management in strategic financial accounting. The researcher will discuss strategic financial accounting and strategic management accounting in accordance with the pioneers' opinions



in this field. The discussion will illustrate what each method offers in terms of strategic management for business organizations (Figure 4.3).

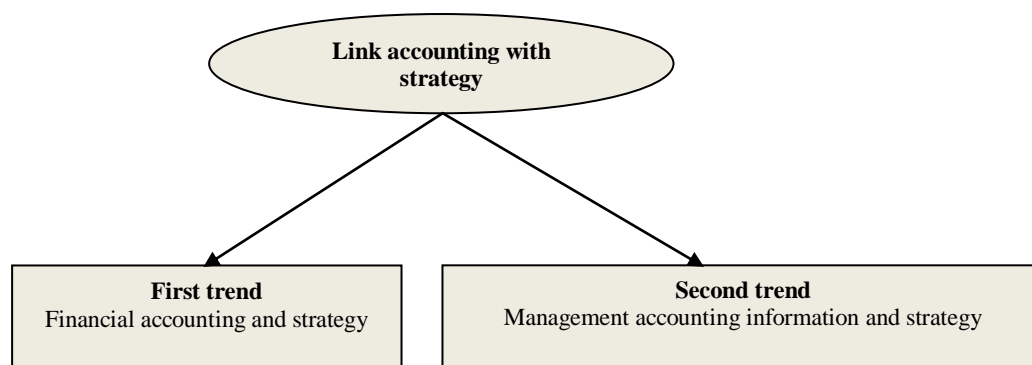


Figure 4.3: Trends linking accounting with strategy

#### **4.6.1 Trend of linking financial accounting with strategy**

Followers of this trend argue that the financial statements prepared in financial accounting include huge volume of financially and strategically useful information. They emphasize that great benefit can be gained from the ratios of financial analysis when merged with strategic analysis in one process, which they call 'Strategic Financial Accounting'. They argue that such a process would enable a deeper and more comprehensive view of an organization's performance, its position and future. They also add that financial statement analysis can be useful in for many strategic purposes; specifically, it can [198]:

1. Formulate organization's strategy to test and analyze its strengths and weaknesses, opportunities and challenges.
2. Recognize major competitors' strategies and determine their strengths and weaknesses, their available opportunities and challenges, and sometimes, their strategic intentions.
3. Develop a better understanding of major clients' positions, their current and future needs.

Followers of this trend argue also that strategic financial accounting is a significant tool to realize and appreciate the effects of strategic changes in business organizations and assess the efficiency of its application. They emphasized that this type of accounting highlights the

strategic view in terms of generating or decreasing value for the organization in general [198]. The researcher argues that this trend agrees with Chandler's [178], which is based on a “comprehensive” strategic view which takes into consideration many factors and links between them and all the goals of the organization. This trend is criticized in that it is mainly based on historical financial accounting information regarding organizations' actual performance. Thus, it does not serve the future strategy required by business organizations. Hence, the researcher can argue that this trend needs more clarification, since the current views do not clarify how the information derived from financial statements can be used in formulating the strategy, or how competitors' financial statements are analyzed to predict their strategic intentions. Also, an organization's financial statements, generated by the financial accounting process, do not usually include clients' information and their current and future requirements. Consequently, the information that managers obtain from the financial accounting statements are not enough per se. Rather, they should be complemented by further information that serves strategic analysis purposes, which is more often obtained from other parties. The researcher believes that one shortcoming of this trend is that it does not really link strategic financial accounting and strategy since it is fundamentally based on using financial analysis ratios, which might be beyond the scope of the financial accounting, falling instead under management accounting methods. However, such ratios are not in the financial statements that represent the final output of the financial accounting; rather, they are measured and analyzed in order to assist management to perform their jobs. Moreover, it might be difficult to link between the strategic financial accounting and financial accounting, since financial accounting focuses on preparing reports that serve external parties. Also, it is attributed with totality and basically handles historical events, which is unlike strategy that focuses on providing detailed information to internal parties for purposes of decision-making for the future.

#### **4.6.2 Trend of linking between management accounting information and strategy**

Kaplan and Norton [157] developed the BSC which made it distinctive from the traditional perspectives of management accounting. They noticed that the traditional assessment process stemming from the function of financing is marred by the existence of control bias. When such systems assess employees' performance, compared with the plan, they try to control behavior. However, BSC reflects what the organization tries to be, thereby emphasizing the organization's strategy and vision instead of controlling behavior. Kaplan and Norton

confirm that strategy and vision are of interest to stakeholders in the organization. Therefore, it is necessary to develop systems to assess performance that directly consider not only the financial aspects, but also customers' interests, internal activities of the organization, innovations and future trends [15]. BSC has gained vast acceptance, being considered by some as one of the most significant instruments in management accounting [158]. This might be a result of its inclusion of more KPIs, which explains the relationship between tactical activities of the organization and the extent to which it is fulfilling its strategic goals.

BSC includes, in addition to financial KPIs, another group of KPIs related to customers, internal operational processes, learning and growth and internal control. Kaplan and Norton [199, 200] called this additional group of KPIs "the leading measures" [120]. This suggests the benefits achieved by using an integrated group of KPIs, and confirms that the relationship between them is not causal, rather correlative, which means that it is necessary to rely on a group of KPIs all together in order to assess the extent to which organizational goals are being achieved. The contents of BSC as explained by Kaplan and Norton are shown below in Figure 4.4.

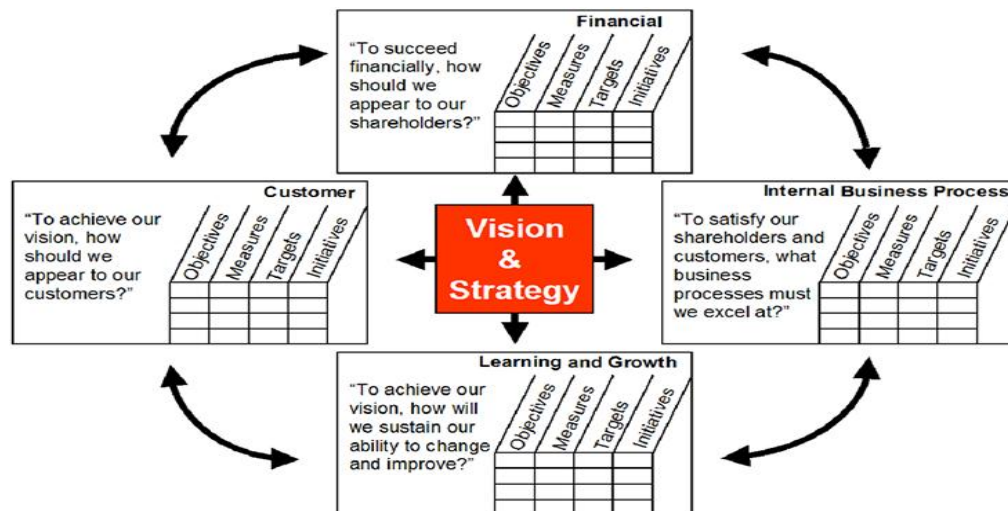


Figure 4.4: BSC Contents [201]

From Figure 4.3, the researcher concluded that BSC can be used to assess AIS performance in an integrated strategy, by linking the various objectives of the organization in order to support its competitive position and its ability to deliver information to stakeholders, and strengthen its internal control. In the BSC, an organization's vision and strategy are

translated into goals and KPIs are classified according to more than one perspective. Each of them assesses performance through a different perspective. Performance is assessed from the perspectives of shareholders, clients, internal operations, learning and growth and internal control. The following sections are intended to provide a clearer understanding of BSC.

#### **4.7 Balanced Scorecard a comprehensive system to measure performance**

BSC is a comprehensive and integral system used to measure the strategic performance of organizations since it includes both financial and non-financial indicators [157]. This model includes four major dimensions considered as performance support for most companies. These dimensions include financial, customers, internal operations and learning and growth dimensions [157]. Due to the importance of BSC, companies around the world hasten to adopt and apply it in their daily operations. A recent study concluded that 33% of Australian companies apply the BSC, and emphasized that the BSC is a worthwhile strategic system for measuring performance [202]. Another study estimated that about 60% of the richest 1000 companies around the world have applied the BSC [203-205]. As is the case with the international companies, active companies in Jordan, especially the banks, have applied BSC [206, 207]. They are considered as one of the most significant aspects of the Jordanian financial system. Also, they have played a fundamental role in developing local savings, increasing investments and providing the required financing for economic units. The achievements of the banking sector are considered as an integral part of the many achievements of the Jordanian economy, evidenced by the enhanced efforts to achieve more financial and monetary stability [208]. Jordanian banking activity has undergone qualitative development during recent years especially in business and e-business that are based on modern technology, while simultaneously, the challenges they face from competition from foreign banks or other financial companies, are increasing [206]. Given such challenges, in addition to the many substantial changes witnessed in the banking business during recent years, Jordanian banks have had to adopt advanced and integrated methods of performance assessment that provide a comprehensive understanding of all the dimensions of their activities. Such methods enable banks to improve the efficiency of their operations and face the challenges in order to achieve their objectives and ensure their continued viability [206].

The next section provides a discussion of the motives behind the development of the BSC.

## **4.8 Motives for developing the BSC**

In 1990, Kaplan and Norton carried out a year-long research project with 12 organizations at the leading edge of performance measurement. They came to the conclusion that traditional performance measures, having a financial bias and being centred on issues of control, ignored the key issue of linking operational performance to strategic objectives and communicating these objectives and performance results to all levels of the organization [209]. In 1992, an article was published by them titled "BSC to measure performance motives" in Harpoon Business Review, attracting many researchers' attention to this method, which resulted in an increase in the sales of this periodical. Realizing that there is no unique measure that can give an integrated view to performance or reflect all of the necessary aspects in the company, Kaplan and Norton proposed the BSC concept as a solution for all of these defects. In their view, the BSC has a substantial and significant impact when employed to effect a change in the organization. In a rapidly changing environment, pioneer companies increased the use of the BSC to introduce and communicate the fundamental factors that create future values through indicators and measures that define a company's objectives [201]. If companies want to survive and continue in a competent environment, they should use management measures and systems stemming from their strategies and capacities [201]. Thus, BSC is considered as a management system that aims to decrease the gap between an organization's strategic objectives and its operational implementation. This can be done by translating the organization's vision and strategy into a framework of goals and standards that is clear to staff, thereby providing guidelines to staff members and harnessing their capabilities and capacities in order to achieve long-term objectives (Figure 4.4) [209].

## **4.9 Benefits and significance of the BSC**

BSC can be defined as a management system the aim of which is to assist an organization to translate its vision and strategies into a group of integrated strategic objectives and standards. This is due to the fact that the financial report is not the only method that companies can use to assess their performance and activities and plan their future trends [201]. Based on this definition, the following can be concluded:

- a. It is one of the modern management accounting system's tools concerned with measuring and assessing organizations' performance in order to increase its competence in the contemporary business environment, including two types of indicators, the financial and non-financial indicators related to four dimensions (financial, customer, internal operations, learning and growth) [210].
- b. BSC translates the company's vision and strategy into a comprehensive group of performance standards that provide an integrated framework to execute its strategies, and achieve both financial and non-financial objectives. The significance of BSC is that it is a unified and integrated system that strikes a balance between the financial and non-financial performance standards and short-term and long-term performance standards of an organization system [211].
- c. BSC assists a business organization's management to take the appropriate decisions as it provides the necessary information and tools to manage the organization effectively. It also provides management with a precise tool to realize the objectives and methods of achieving them by translating the organization's long-term strategy into a set of performance standards [212].
- d. BSC emphasizes the achievement of financial objectives in addition to the other factors that contribute to supporting and achieving those objectives [213]. BSC also plays a significant role in balancing the various aspects of competence in a harmonized and creative manner [214]. On the other hand, studies such as that of Landry [215] discussed the possibility of using BSC in international and multinational companies to assist in applying, communicating and executing their strategies effectively, because of its ability to integrate the financial standards with the non-financial standards, which enables companies to invest and disseminate their tangible and intangible resources.

The significance of the BSC and the way it balances several issues can be summarised as follows [157, 213]:

1. Determines financial and non-financial performance standards.
2. Analyses organization's internal and external components.
3. Designs previous and lagging indicators to control work towards achieving the objectives.

4. Provides standards to define the direction (where do we want to be?) and standards of how (what should we do to reach what we want?).
5. Sets priorities for long, medium and short-term objectives.
6. Offers mechanisms to move the organization and lead change through.
7. Makes possible constant communication to enhance staff capabilities.
8. Provides consistency between staff objectives, incentives, core skills, and strategic objectives.
9. Offers a feedback system that encourages learning and sharing of experience inside the organization.

## **4.10 Four core perspectives**

BSC is considered as a business system that describes the organization's strategy from four perspectives, and as a communication system which links the objectives set by the various parties of executive and operational managers. It is a system that measures previous performance and directs the future performance, and is a strategic management system that contributes to effecting and managing change in the organization [201]. Figure 4.4 below shows the BSC method and its four major aspects.

### **4.10.1 Financial perspective**

This is concerned with the financial aspect of the business organization's adopted strategy, as Kaplan and Norton did not ignore the traditional need for the financial inputs, since the timely and accurate financial data always take priority and managers have to ensure their availability [157].

### **4.10.2 Customer perspective**

Modern management philosophy now focuses more on achieving customer satisfaction and fulfilment of customer requirements. This is because customers have the option of taking their business to other providers (competitors) to meet their needs. The significance of this perspective emerges as it gives an idea about the expected future performance, since bad performance, from the recipient's viewpoint, is considered as a major indication of future decline, even when the financial image of the company is good. This aspect emphasizes the

importance of measuring the company's performance by determining the extent of the service recipients' satisfaction, analysing the company's market share, and the types of operations performed to serve its customers [157].

#### **4.10.3 Internal operations perspective**

This perspective refers to internal operations, since the measurement of a business organization's performance, in terms of internal operations, will reveal to the managers how to execute the operations, and whether the product or service is aligned with the requirements of the recipients. This is relevant to all customers in terms of creating value and improving the financial position of the business which in turn benefits the stakeholders.

#### **4.10.4 Learning and growth perspective**

This perspective is concerned with staff training, education and personal development of each individual in the business organization. Business organizations that are concerned with managing knowledge and transferring it to its staff consider their staff to be one of their major resources. In light of the current environment of accelerating technological change, it has become necessary for employees to cope with these changes through constant learning. Kaplan and Norton emphasized that the learning and growth dimension includes many issues such as instructors and supervisors within the organization, simplicity of communication among the staff in the organization that enables them to get assistance when a problem occurs, and it also includes technological tools such as the intranet [157]. The BSC can strike a balance between the various strategic measures in an attempt to achieve the integrated objectives of the business organization. The BSC translates the organization's tasks and strategy into a set of procedures that constitute a framework with which to apply its strategy. The BSC does not focus only on achieving financial targets, but highlights the non-financial objectives which the organization has to achieve to fulfil its financial targets. The BSC measures four aspects of the organization's performance: financial, client, internal operations and learning and growth. The strategy of the organization affects its strategy to detect performance in all of these dimensions [216].

The BSC tool was named as such since each of these dimensions and the non-financial performance are measured to assess the short-term and long-term performances in one



report. The BSC reduces managers' concentration on the short-term performance in areas such as the seasonal returns, since the non-financial strategic indicators related to basic performance, such as customer satisfaction, measure the changes the company makes in the long term. The financial benefit of these longer-term changes might not emerge directly in short-term returns, but if there were a company strategy and strong improvement in the non-financial procedures, that would usually denote the formation of a future economic value[213]. The assessment and measurement of performance had, for a long time, been limited to financial results only. These were not enough to decide the validity of an organization's vision and mission; hence, organizations needed a systematic and clear basis on which to assess performance by measuring both the financial and non-financial results [201]. The term 'balanced' in the BSC emerged since measurement systems for financial performance previously concentrated on the financial results which are important to the business owner, but in the 'eighties and the beginning of the 'nineties, attention significantly shifted to consumers, quality and services, and ignored the owners' interests. Hence, an imbalance occurred which resulted in many companies being successful in terms of providing quality and customer satisfaction, but were exposed to loss. Hence the term 'BSC' reflects an attempt to strike a balance between the financial and non-financial measures in order to address both short-term and long-term performance.

#### **4.11 The basic roles of the BSC**

The use and application of the BSC as a strategic tool and management system contributes to many functions and roles of the organization, mainly clarifying and interpreting the organization's vision and strategy, communicating and linking its strategic objectives with the implemented measures, planning and setting objectives, and arranging strategic initiatives. Below, is a description of these roles [157, 205].

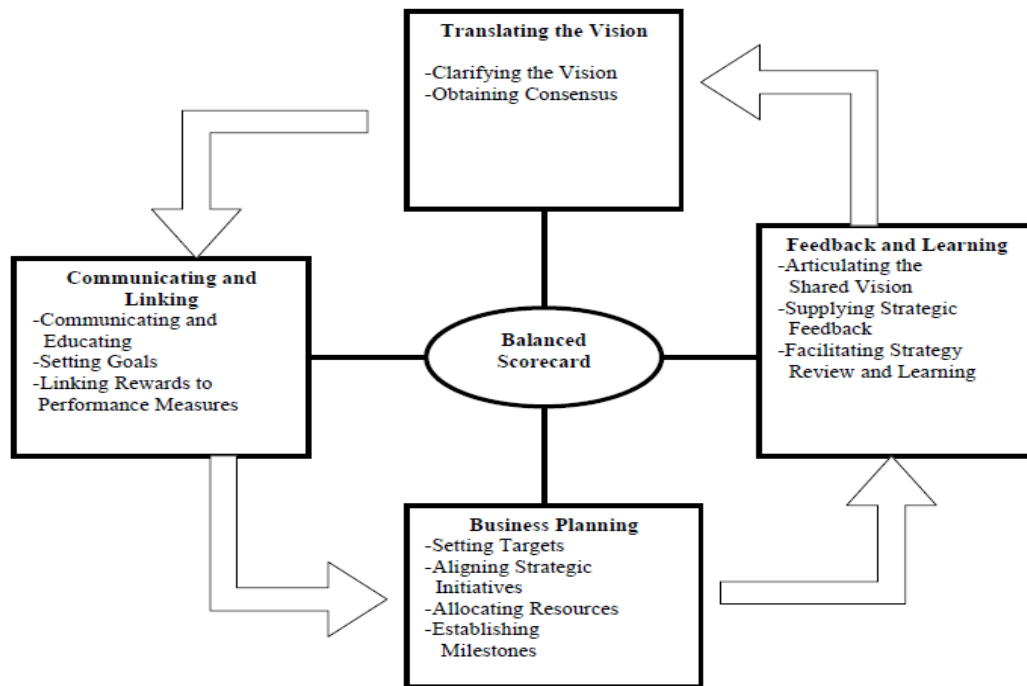


Figure 4.5: The basic roles of the BSC: four processes [201, 205]

#### 4.11.1 Translating the Vision

The BSC interprets the vision and strategy of the organization into objectives. It also identifies the market of the organization, and the categories of service recipients benefiting from the organization. Also, the organization should identify the appropriate goals and standards for each perspective of the BSC, which includes the internal processes, learning and development, service recipients and financial perspectives. Thus, the BSC encourages management to set up the measures they will use to activate their vision.

#### 4.11.2 Communicating and Linking

It is necessary that all staff in a business organization have a full awareness and understanding of the main goals of the organization to ensure the success of the strategy. Staff awareness and understanding of the main objectives enable them to realize their expected role, which in turn leads to the consistency of their sub-goals with the general strategic goal of the organization. Strategy implementation should start from both top and bottom of the organizational structure and educate staff who will implement the strategy. Interpretation of the goals and standards can be made by relating to particular groups and applying the strategy to a business organization. By linking these goals to individual

performance, a personal BSC is achieved, and in this way, the employee can realize how important his/her performance is in supporting the organizational strategy.

#### **4.11.3 Business Planning**

Kaplan and Norton [157] argue that most business organizations' strategic planning and budgeting units are separate. Integrating these two functions might be necessary to achieve budgets' strategic objectives. Creating a BSC might be the appropriate tool for business organizations to do the integration. It is also necessary to agree on performance standards of BSC perspectives, so the business organization can identify the most influential catalysts for the required output, and then determine the criteria for measuring the progress made with these catalysts.

#### **4.11.4 Feedback and Learning**

Most companies' feedback and review processes focus on whether they have achieved the objectives of the financial goals of the business organization, units, or staff. By using the BSC as a management system, a business organization can monitor and control the short-term results through the other three themes: customer, internal business processes, and learning and growth. Consequently, a business organization can review and reassess its strategy according to its recent performance. Therefore, the BSC assists the business organization to adjust its strategies to reflect real-time learning.

### **4.12 Dimensions contained in the BSC perspectives**

It is necessary when designing the BSC to enable the linking of the goals and standards within the business organization in their different aspects. Each of the BSC dimensions should include the following perspectives:

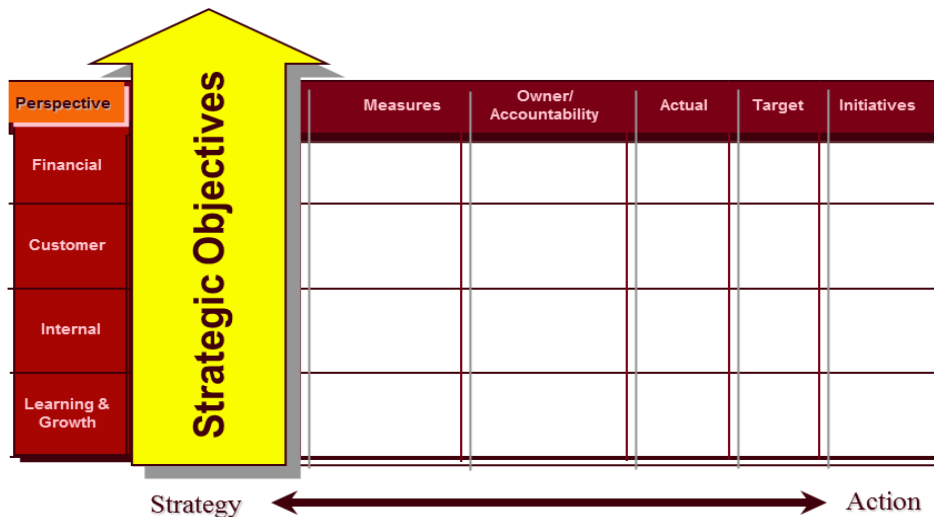


Figure 4.6: The perspectives that should include each aspect of the BSC

1. **Objectives:** The target results, and objectives in general, distributed on the BSC dimensions, holding the same strategic significance, have to be specific, measurable, achievable, reasonable and with specific time for implementation.
2. **Performance Measures or Indicators:** These represent the measure that determines the status of the target to be achieved by comparing it with a pre-set value. The indicators should be distinguished with a set of characteristics which are: related, easy to use, frequent and dependable to reflect performance level. Also, indicators can be divided into two major categories, the final indicators which can be used later in the process, and the motivating (advanced) which can be the former.
3. **Accountability:** This refers to work groups, management, department or staff responsible for performance measurement or indication by linking the objectives to the standard of their work scope. Also, they assume the responsibility for achieving the target results on according to a standard level and with full consideration given to factors that help to achieve these results. At the same time, they assume responsibility for developing initiatives and propositions that promote the level of performance real necessary to achieve the target results.
4. **Target Results:** A specific value of measurement that indicates the extent of deviation (negative or positive) from the set target. Target results should be presented as figures or proportions related to specific time, achievable goals, and directly reflect the target results or achieve a specific level of performance compared to the general performance on the organization's level of work.

5. **Initiatives:** Represent a list of tasks to be executed to achieve the target results or operational projects to achieve the target. It is necessary for every initiative to specify the required resources and the expected benefits, difficulties, risks and the required timetable to execute them.

### 4.13 Reciprocal and causal relations between the perspectives of the BSC

Many strategic operations represent causal and result relations; therefore, the measure should achieve the relationship between them in order for management to assure its validity (Figure 4.7) [210].

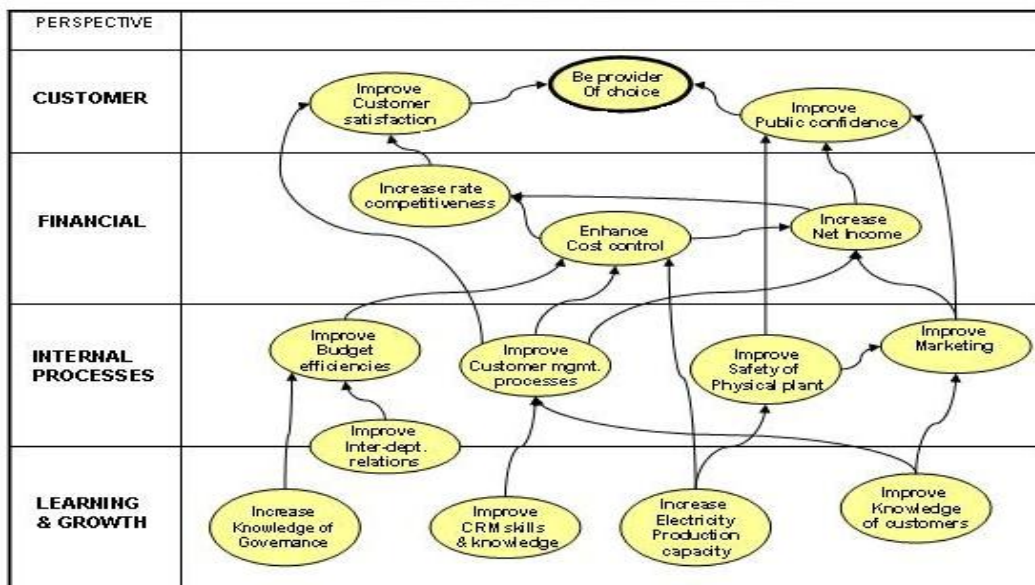


Figure 4.7: Reciprocal and causal relations between the dimensions of the BSC [217]

The relationship should include the four dimensions of the BSC. For example, the rate of capital return increases by the increase of sales, which reflects recipients' loyalty; thus, loyalty and customer service time are entered on the recipient's part of the BSC. To achieve the service within a short time, performance time must be reduced with quality of internal operations (to be entered in the internal operations) which is achieved through training and developing staff skills (to be entered in teaching and learning part) [201]. Figure 4.1 shows this example of the four major elements comprising the balanced performance measure.

#### 4.14 The methodological steps to design and implement a BSC

Building a BSC must start from the higher level then move to lower levels starting with the organization's strategy, where the BSC is translated into tangible objectives and performance measures that represent a balance of various aspects. Despite the various opinions of authors and researchers regarding the steps required to design and apply a BSC, there is a semi-agreement among them that the arrangement and time required for each step should be adjusted in accordance with the characteristics and circumstances of each organization, which was emphasized by Kaplan and Norton [201, 218, 219]. Figure 4.8 shows an integrated vision for executing a BSC. It is worth mentioning that a number of other studies in addition to Saghaei [220] established the methodological steps to design and apply a BSC in an explicit and comprehensive method, as follows:

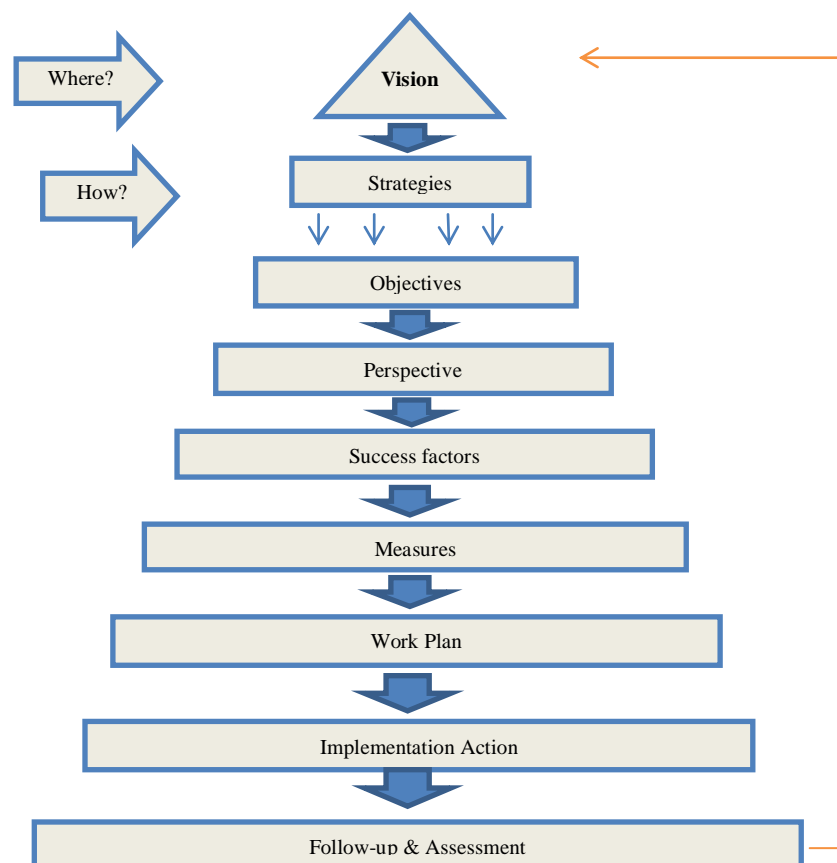


Figure 4.8: Methodological steps to design and implement a BSC

### **Step one: Formulate the organizational vision**

The vision represents concepts, trends and expectations of the business organization in the future long-term, and is considered as the compass that directs the organization, and is a Conclusion of its future expectations and basic principles. The vision must be characterized by participation, challenge, direction, inspiration and interrelation [219].

### **Step two: Specify strategies and build the general strategic objectives**

The model for measuring performance is basically a tool that contributes to formulating and implementing the strategy of the organization and reviews and follows up its implementation. The model must be viewed as a tool that translates an empirical strategic vision into specific standards and objectives. Thus, the purpose of this step is to translate the vision into a tangible concept, consequently achieving a general balance between the various fields. Formulating the strategy usually necessitates a great deal of complexity, and requires a great deal of thinking and inputs of various types, as a result of the various aspects and variables that should usually be studied. There is no agreement regarding the proper procedure to formulate the strategy of the organization, nevertheless, a substantial question is usually raised of how the organization would gain a competitive advantage better than its competitors and maintain it. This question is at the heart of the formulating process, where most experiments denote that the greatest feature of BSC model lies in this specific aspect , since the model facilitates analysing the vision and turning it into specific strategies based on facts, which enables the individuals to comprehend it and work through it [201].

### **Step three: Determine BSC perspectives**

In this step, BSC perspectives are determined, which constitute the main instrument of the performance assessment system. This is associated with the hypothesis of cause and effect, through linking the balanced performance measures with a series of relations connected in one relation and associated with performance (initiatives) in each of the BSC perspectives to achieve the strategic objectives of the business organization [157].

#### **Step four: Identify the prevailing success factors**

This step facilitates the move from the strategies described above, to discussing and deciding what is required for the success of the measure and the substance of the most effective factors on the target results. In other words, the business organization has to decide and prioritise the major success factors. An appropriate way to do this is to conduct discussion groups to decide the most significant factors to achieve the pre-set strategic objectives. Attention should be given to making horizontal and vertical correlation between the major success factors. In other words, there is need to identify whether or not the measures are internally consistent and reasonable regarding its aspects, and relevant to each other [221].

#### **Step five: Define measures**

In this step, the standards are formulated to identify the causes and the results and to create a balance between them. A final report is prepared by higher management, although it is better to have the involvement of a person with previous experience in BSC measurement projects who would be most useful in correlating the success factors with the measures. This step includes the follow sub-steps [157].

- a. Prepare the measures and define the reasons and results of creating balance between the various measures: In this step, major measures of relevance are prepared to be used later. As in the other steps, we have to start practising a kind of brainstorming. This approach does not rely on discussing ready notions, rather current ones which have been provided during discussion. The biggest challenge lies in finding clear reasons and results and creating a balance between the various measures in the selected vision fields. Therefore, it is necessary to conduct a discussion regarding the possibility of reaching a balance between the various measures, and in such a way that the short-term plan improvements do not conflict with the long-term objectives.
- b. Formulate the comprehensive measures: After completing the previous steps, all higher level measures are gathered in preparation for approval and presentation to the relevant personnel. To facilitate implementation, based on the nature of the organization and its size, the measures are generally analysed at the higher level, and correlated and applied to realistic organizational units at a lower level. Since one of the measures' purposes is to enable personnel to clearly see how the organization and its general objectives affect the operations, it is necessary to analyse performance at a level where it becomes tangible and adequately comprehended.



### **Step six: Determine and develop a work plan**

In this step, it has to be determined how to assess the success of using BSC through formulating the objectives, and setting a work plan [218].

- a. Formulate objectives: The final objectives are formulated as propositions to be submitted to the unit leader in the project in preparation for the final approval by higher management. Long-term objectives have to be clarified in order to be able to constantly track them and take any corrective measures in time. It is essential that these objectives be coherent and consistent with the overall vision and the general strategy, without any contradiction or conflict between them; for this reason, horizontal and vertical correlation and integration should be maintained between the objectives alike. It is also important to allocate the responsibilities for setting goals and assessing performance.
- b. Set a work plan: To be prepared by the project group at the end and to complement the measures, we must also identify the steps to be taken to achieve the goals in order to achieve the objectives and the vision that have been formulated. The work plan has to include individuals in charge and a timetable for the preparation of the interim and final reports. Due to the significance of these plans and their central role in the organization's life, it is most often preferable that the group agree on a list of priorities and a timetable in order to be prepared for unexpected problems.

### **Step seven: Determine implementation actions**

This step requires pointing out the activities and actions to be implemented to achieve the objectives and move the plan to the real world, which in turn requires setting the annual objectives, distributing and allocating resources, determining responsibilities and tools, supporting programs and culture, trying to link that with the motive, and upon practising the executive actions, to take into account that it affects each of the organizations' employees and managers who in turn are affected by it [218].

### **Step eight: Follow-up and assessment**

It is necessary to constantly follow up the organization, and give attention to measures to achieve its target function as a management's dynamic tool. To achieve this purpose, use is made of suitable communication technology solutions to facilitate the gathering of data and

preparation of reports. It is also important to use measures throughout the whole organization for all aspects of daily management, as these provide the basis for the daily work schedule of each unit. Therefore, the executive plan should include proposed rules and methods to ensure the transfer of recording the degrees of the balanced performance measurement into a part of the business organization's daily work [157].

#### **4.15 Bank AIS's comprehensive performance in accordance with the BSC**

Because of the investors' rational perception of the financial theoretical policies that emphasize the long-term value of their investments compared to the short-term accounting profits, banks had to develop measures to assess their performance so that stakeholders' financial returns were maximized. Banks needed to explore those activities that returned higher revenues to the bank for the investors' capital costs, promote the profitable activities and eliminate the activities that do not secure returns. As long as the financial results showed a number of different elements and did not specify the activities that led to these results, either in profit or loss, the banks tended to apply a number of measures in order to estimate the future financial performance and operational performance. Thence came the idea of building an integrated system to assess performance adequacy presented by Kaplan and Norton [157] as they selected 12 banks in the USA to determine the requirements of measuring the efficiency of comprehensive performance; this led to the creation of a new system called BSC. It is a set of financial and operational accounting measures to be submitted to the managers which reflect a comprehensive and clear image of the business organizations' performance. It is considered as one of the innovative methods in the management and financial accounting field, since it is suitable for the economic units with customers and special distribution channels, production means and financial performance measures. It was known as a model for presenting several methods whereby management is able to gain satisfactory returns by making strategic decisions that take into account the reflective impacts on the financial returns, customers, operations, internal steps and individual learning perspectives. Also, analysing performance and measuring the mentioned perspectives takes into account both the financial and non-financial (operational) performance standards for short- and long-term objectives [222]. It is noted in this regard that there is interaction and interdependence between the financial and non-financial measures to achieve and implement the strategy of performance efficiency measurement.

Bearing this in mind, this model can be utilized to improve and increase the efficiency of accounting information systems' in the commercial banks especially in Jordan.

The financial perspective is considered as one of the major perspectives for the comprehensive performance assessment model which uses the financial ratios and financial analysis based on financial figures, and extracts from it the realized profit and sales volume. This perspective points to a mechanism that creates a value for bank proprietors. Customers' perspective measures respond to the changes in the environment of the current era where competition is open and fierce. Therefore, the goal of surviving and retaining a substantial share of the market are the most significant aspects of sustainability and reflect a bank's ability to provide high quality services with low cost at a reasonable price, taking into consideration customers' changing needs. The BSC recognizes the importance of the customer perspective and considers it as one of the banks' performance measurement components. Both Kaplan and Norton [120] emphasized the significance of this perspective, as the organization's management seek to achieve a high level of customer satisfaction, since the level of satisfaction affects the rate of acquiring new customers, the possibility of maintaining the current customers, and its share in the market. The business organization, by heeding this perspective, can become aware of the customers' attitudes towards the organization. The third perspective in the BSC is concerned with measuring the future performance of the organization through presenting the internal activities and operations executed by the bank to achieve its financial objectives and customers' requirements, i.e., shareholders', proprietors', and customers' objectives by creating and introducing new products and developing them in light of market determinants, and diagnosing market trends and customers' needs; also, the operation cycle focuses on providing customer services in order to increasing the level of customer satisfaction and service [120]. The fourth and last perspective of this BSC is learning and growth, which has strategic objectives for the bank and its future view, as it focuses on developing the capacity of its staff as they are its infrastructure that have worked on building and developing it for a long time. They are familiar with the organization's culture, systems and procedures used to promote customer satisfaction. Staffs need to know how to use modern technologies to cope with the IT era and ensure customers' satisfaction and fulfilment of their needs, and the stakeholders' objectives; that is, ultimately the staffs determine how the bank will continue to develop, innovate and create higher value for itself.

## **4.16 BSC usages and strategic planning**

In response to the business organizations' need for tools to translate their strategies into business, and monitoring to execute their strategies, Kaplan and Norton [157] innovated in the early nineties the Business BSC as a tool to translate the intangible issues such as customer satisfaction, quality of operations, and organization development, into strategic, effective and efficient objectives. The philosophy of BSC, which has been used in successful organizations, is based on the notion that "If you cannot measure, you cannot manage". It relies on tracking the significant measures directed towards the organization's work strategy, such as measures of quality, customer, innovation and market share which might reflect the economic situations and future growth in a manner that exceeds what profits reflect. Also, it provides a detailed overview of the organization's strategy and performance measures including the BSC target and actual performance measures [223]. At the same time, it provides a solid basis for responsibility and accountability, since it provides executive management with the ability to develop the measures that assist in accurate prediction of the validity of the business organization's objectives [224]. The following section presents a discussion of the strategic plan for banks by using BSC principles.

### **4.16.1 Strategic plan for banks**

The strategic plan of the bank is known as: a series of decisions and actions of interest, based on the core issues of the bank. Such issues include: improving the profitability of the bank, the business combination or the services provided by the bank to the dealers, the bank signed on the national, regional and international map of the banking system, bank's share of the various banking and other activities [225].

### **4.16.2 Building the bank's strategy**

This process represents the first phase of strategic planning in the bank, where the identification of the main features of the bank's strategy, and the process to be modelled after the set goals, takes place. Therefore, this process involves four successive stages as follows [226]:

1. **Determine bank's vision:** In this stage, the general long-run target prospects of the bank are determined, where a clear vision of these prospects is established, through which the future identity of the bank is identified.
2. **Determining bank's message:** Bank's message represents a translation and Conclusion of bank's goals. Here, the bank's main and subsidiary targets are identified, the current activities performed by the bank and those planned for future implementation are pointed out in an attempt to achieve the bank's future vision.
3. **The formulation of objectives:** A translation of means, decisions and procedures through which the bank can achieve its mission then convert it into real results according to the performance levels to be achieved in the future. When formulating the objectives, one should take into account that objectives are measurable and all managers in the bank should be involved in its formulation. Moreover, objectives are of two types: First, financial strategic objectives such as profitability ratios, indicators of activity and productivity, growth indicators, and bank's shares in the market. Second, non-financial strategic objectives which include: quality of products and services offered by the bank, launching new services or upgrading existing ones. Objectives also include introducing the recent updates in banking technology to the banking market, the local leadership in the banking sector, and strengthening the internal situation of the bank. This is in addition to developing customer relationships, improving the quality of communication in bank, and improving the image of the bank in the eyes of customers in particular and the public in general.
4. **Strategy Formulation:** This is the final stage in the construction of the bank's strategic plan, where the strategy is formulated according to the bank's mission and objectives, taking into consideration the variables in each of the external and internal environment. Therefore, the strengths and weaknesses in the internal environment are to be studied and analysed, and opportunities and threats in the external environment are identified.

This study proposes that the strategic plan of banks does not differ in its broad sense from the strategic plans of other business organizations. The only difference is in the decisions and procedures related to the major issues pertaining to a bank. Meanwhile, building such a plan is a stage of strategic planning which is a deliberate process that includes a range of activities related to constituting the mission of the organization.

### **4.16.3 Jordanian banks' strategic plan**

This plan represents the Central Bank's view, mission and strategic plan for the years (2007 - 2009). It also includes achieving the national and organizational goals derived from the Central Bank Law, and the recommendations of the national agenda. This plan aims to identify the features of future Central Bank strategies, the possibility of access to them, and the available possibilities that help to achieve these strategies, which can be summarized as follows:

1. Continue applying effective monetary policy through the use of indirect instruments (open market operations) to control the levels of domestic liquidity, and the use of key interest rates in the Central Bank in managing monetary policy. This policy is intended to maintain the structure of appropriate interest rates, and comfortable levels of reserves in foreign currencies, as well as fixing standards and the determinants of the national payments system. Consequently, this would ensure speed and efficiency in helping banks to overcome the problems, and contribute to the development of the Jordanian capital market.
2. Continue management and development of human resources and review of the development of internal systems in the bank regarding these.
3. Focus on scientific studies and keep up with banking developments, which is the basis for a sound decision-making process.
4. Continue following the bank control system that keeps up with the best international standards and practices. The fundamental strategic vision of the central bank in controlling the financial institutions can be seen in its contribution to enhancing the financial and technical strength and durability of banks for the purpose of reaching highly effective and competitive banking.
5. Continue efforts to assemble banking system units, to form technically and financially large and strong banking units for regional and international competition, by encouraging ownership of existing banks or mergers or strategic partnerships. Or expand existing banks' capital base, by attracting more local or external investors, or establish investment finance bureaus.

The researcher argues that this strategic plan of the Central Bank represents a common vision and a clear mission for the banking sector institutions in Jordan. This strategic plan, if translated into practical plans and programs during the years of the plan, will be a guide for

banks, especially since it includes a vision to achieve the national and institutional objectives, since it is derived from the Jordanian Central Bank. Moreover, the strategic plan was based on an analytical study for the internal and external work environment, prepared by the Central Bank at the beginning of the planning process. It was established after identifying the strengths, weaknesses, opportunities and challenges that the banks are expected to face in the future.

#### **4.17 Conclusion**

In this chapter, the researcher examined the importance of strategy and then discussed its application in accounting, and reviewed the various methods presented in the accounting literature as a result of merging accounting and strategy. Also, the researcher determined the effect of this merger on the information that accounting seeks to provide. The researcher also reviewed trends linking accounting and strategy, describing the type of information provided by accounting to support strategy and major reflections that represent BSC method to develop AIS to support the business organization strategy.

It is necessary to implement competitive strategies to provide information that will help to decrease costs and control production and marketing costs. It is also necessary for accountants to cooperate with marketing management to obtain information on competitors' cost structure and the products on the market. Also, there is a need to link the process of AIS preparation with an organization's strategy, prepare strategic AIS in order to develop new production capacities, reach new clients and new markets, and create substantial improvements on the available processes of an organization's production and capacities. This would guarantee making use of strategic AIS in applying strategic accounting instruments and achieve the consequent features. To explain that in depth, in the next chapter, the researcher will discuss the previous studies, which are related to the topic of this study.

# Chapter 5 - Literature Review

## 5.1 Introduction

A number of studies in the literature deal with AIS from several perspectives and examine how it is influenced by various factors. These studies are diverse in their objectives, variables, subjects as well as in their contexts. In this chapter, the researcher reviews the relevant literature pertaining to all business organizations; the problems are explored and what those studies have achieved is acknowledged. Furthermore, the researcher will try to show how the objectives of the present study differ from those of the previous works. It should be noted at the outset that the researcher has classified the previous studies according to three objectives, namely: (a) achieving and sustaining competitive advantage; (b) providing comprehensive information to different stakeholders; and (c) increasing the role of AIS in improving the efficiency of internal control systems. The latter is discussed in terms of its application in two different areas: business organizations and banks, in harmony with the objectives of AIS improvement as shown in Figure 5.1.

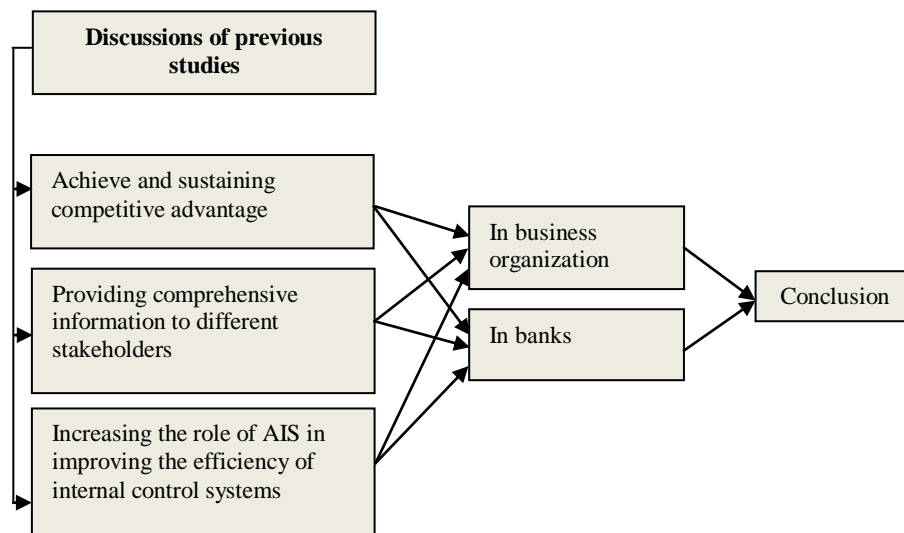


Figure 5.1: Purposes of AIS Improvement According to Previous Studies



The structure of this chapter is as follows. In Section 5.2, the achieving and sustaining of competitive advantage are discussed. In Section 5.3, the significance of providing comprehensive information to different stakeholders is examined. Section 5.4 discusses the importance of AIS in improving the efficiency of internal control systems. In Section 5.5, critical evaluations are conducted of the existing approaches to improving the performance of AIS in banks. In Section 5.6, the problem of the study is presented as determined by examining the previous literature and finally, Section 5.2 summarizes the chapter.

## 5.2 Achieving and sustaining competitive advantage

The achieving and sustaining of competitive advantage in business organizations and banks, as examined in previous studies, will be discussed as illustrated in Figure 5.2 below.

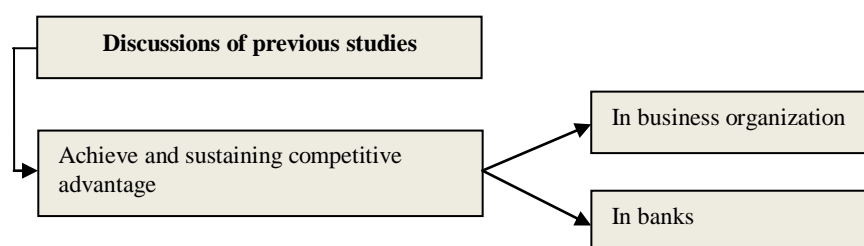


Figure 5.2: Discussions regarding the achieving and sustaining of competitive advantage

### 5.2.1 Various approaches to achieving and sustaining competitive advantage in business organizations as discussed in the literature

Gordon and Miller [227] is considered to have initiated the beginning of interest being shown by accountants and researchers in improving the performance of AIS. Since then, many studies have been conducted in an attempt to establish the most important Key Performance Indicators (KPIs) that affect and contribute to the improvement and development of AIS performance, in order meet the accounting information needs of recipients. The aim of this empirical study was to demonstrate the impact of KPIs theory on the design of AIS which takes into account the environment, the organization, and the style of decision-making. The study concluded that an organization that operates in a dynamic,

unstable and dramatically heterogeneous environment is characterized by volatile fluctuations in customer preferences and competitors' actions. Therefore, it is expected that the traditional accounting system will not meet the organization's requirements. Therefore, there is a vital need to improve management accounting methods, such as dealing with non-financial data to provide management with more information regarding consumer trends, competitors' actions, and change factors, since financial statements alone are not enough to provide such comprehensive information. The study emphasized the importance of providing detailed and appropriate financial information to be compared with the estimated figures, and providing non-financial information to rationalize the administrative decision-making.

Powell and Micallef [14] reviewed the previous studies on the relationship between IT as a competitive advantage, and the performance of US industrial organizations, and revealed that this relationship does not exist, although some of these organizations were distinguished from others by their ability to make better use of human resources, which resulted in further improvement of the IT performance. Mahmood [228] examined the impact of investment in IT on the financial performance of companies, and revealed that some companies who spend generously on IT are rewarded with high financial returns. On the other hand, some companies, despite their generous spending, have modest financial returns. This study has confirmed the necessity of accompanying IT investment with investment in the organization's structure. Calderon and Kim [13] attempted to identify the extent of the relationship between the effectiveness of the IT usage and the financial return in the business organizations of South Korea. The study revealed that there is a positive relationship between IT effectiveness and the financial returns for Korean business organizations. Chenhall and Smith [229] examined the extent to which traditional and modern MIS methods were practised by Australian industrial facilities. It also aimed to identify the benefits obtained from using those methods by its users, in order to encourage other businesses to apply those methods in the future. The study also ascertained the significance of the relationship between the size of the company and the application of several advanced techniques, such as auditing standards and performance measures, in light of adopting a set of methods and established management concepts. Results indicated that the Australian organizations generally prefer to use MIS and modern methods. The study recommends that organizations use modern methods that rely on non-financial information and focus mostly on external KPIs as a benchmark, which is not applied on a large scale. Hoque [230] determined the practical impact of the relationship between each of the following independent variables: Using the BSC, Intensity of market competition and Applying the

Advanced Manufacturing Technology (AMT) on the changes in AIS (dependent variable or KPIs).

The study also aimed to examine the impact of both competition and advanced manufacturing systems using the BSC to assess performance, which subsequently affects AIS. In order to test the hypotheses, data for the study were collected from staffs working in 71 manufacturing facilities in Australia. Results of the study revealed that the intensity of market competition has a direct and positive impact on the application of advanced manufacturing systems, the use of the BSC to measure performance, and changes in the AIS. Banker and Srinivasan [231], conducted a 72-month study of eighteen hotels using time series data. The study included a practical proof regarding the extent of the impact of non-financial measures on company performances. Results revealed that a non-financial measure of customers' needs is adequate for future financial performance forecasts, and contains additional important information related to conventional measures, in addition to improving the financial and non-financial performance as a result of implementing the plan.

The study of Reid and Smith, 2000 [232], attempted to define the KPIs that affect the development of AIS by examining the applied systems and modern methods. To achieve the goal of the study, the researchers conducted an analytical study of the various organizational structures of different organizations, and they sought to determine how those organizational differences affect the development of valid systems. They selected four conditional major variables: the competitive environment, strategy, technical systems, and production systems used. This study was applied to a sample consisting of 150 small industrial facilities in Scotland during the period from 1994 to 1998. The study used correlation and simple regression analysis to test the impact of the conditional approach, and conducted interviews with the financial managers to elicit answers to a number of investigative questions. Results were analyzed and presented based on comparisons of percentages. The study concluded that there are significant differences in the application of AIS methods and systems among the organizations, depending on the organizational structure of the company. It also emphasized the importance of having KPIs represented in production systems, strategy and environment in the development of AIS. Lipe and Salterio [233] examined the impact of BSC, specifically, how the BSC comprising the KPIs can be applied to the performance of multiple units, and how other KPIs can be applied to a specific activity. The main conclusion of the study was that when the odd numbers of KPIs are less than the number required to

conduct the initial assessment for the activity unit, it is possible for the KPIs to have less significance in later assessment processes for the subsequent decisions of the unit activity.

Olson [234] conducted a study on a sample of 208 managers in several business organizations in the USA, in order to study the relationship between the strategy of market competence and market focus in terms of the four criteria for a balanced organizational performance. The researchers revealed a significant relationship between market competence strategy and market focus from the four perspectives of performance assessment. Lillis' study [235] was designed to investigate the performance mechanism used by industrial companies in Australia. It was also designed to reveal the difficulties facing managers when they attempted to divide a group of Perspectives into levels of functional operating units. Similar to other works, this study emphasized the significance of designing performance assessment measurement systems that contain financial and non-financial KPIs, related to the integration and logical coherence of the contents of BSC. The study pointed to the difficulties experienced by profit centre managers when implementing the strategy when the KPIs being used are incomplete, especially in terms of meeting customer needs and quality of service.

Solano [236] attempted to integrate total quality management that achieves balance between the product and the effectiveness and efficiency of the production process, as a strategy used by system development organizations with BSC which achieves a balance between the dysfunctional forces that direct an organization. The study concluded that the a total quality management model in facilities that develop computer systems using the BSC model is achieved by combining both business operations and product quality, and its various other aspects. Ittner [237] empirically investigates the relationship between strategic performance measurement, particularly the BSC, and the economic values measurement and actual financials outcomes (accounting and stock returns), by comparing their relative ability to explain company performance, using data from 140 USA's financial services firms. The study provides consistent evidence that organizations that extensively use a set of financial and non-financial measures have higher measurement system satisfaction and better stock market returns than organizations with similar strategies or value drivers. The result also suggests that the BSC and economic values measurement as casual business models are associated with higher measurement system satisfaction.

Stewart and Mohamed [238] built a BSC framework to determine the value that IT adds to the process of project information management in large construction industries in Australia. This framework incorporates five robust IT-related performance management perspectives (operational, benefit, user orientation, strategic competitiveness, and technology/system). A significant result is that the operational perspective is considered the most important perspective, although all perspectives are necessary if one is to holistically evaluate the value that IT adds to the process. Sohn [239] attempted to define the relationship between company strategy and environmental forces BSC-KPIs. The sample of the study consisted of 219 Korean companies. Results showed that the difference in continuity types and environmental conditions affect the significance of KPIs' performance assessment. Alsheikh [240] aimed to identify the level of AIS necessary to achieve the competitive advantage of Jordanian pharmaceutical companies and the relationship between the businesses' organizational and technical requirements for AIS and competitive advantage. Twelve companies from this health sector were chosen for this study. It was concluded that AIS contributes to creating competitive advantage because of its impact on product quality, performance, control of markets, innovation, development and efficiency of operations. Ax and Bjornenak [241] looked at the communication, dissemination and transformation of the BSC in Sweden from the supply side perspective. This study examined the way in which the BSC is communicated to potential adopters in Sweden, in order to identify the origin of the elements that are linked to BSC in the communication process. It also aimed to discuss and analyze the role played by these elements in the dissemination process. The study covers the period 1992-1999 which was a period of rapid growth of the dissemination of the BSC in Sweden. Results revealed that the bundling of the BSC with other ideas could be seen as a fashion-setting process that affects the transmission of the BSC in Sweden. Turner et al. [242] designed a performance management system with appropriate AIS. It also aimed to implement and assess the impact of this technique on management and business, then identify the factors supporting it that were affecting management and business. The researchers structured a pilot study based on case studies of four Scottish-based companies with an interview carried out before and after six months of implementation. The study revealed that the technique should bring improvements in identifying business weakness, facilitating continuous improvement, increasing transparency and visibility, and increasing positive behavior.

Hu and Quan's work [243] explored the causal relationship between IT and firm productivity/performance, by using the Granger causality model to determine the exact nature of the strong correlation between IT investment and productivity. Furthermore, the study measured

the impact of AIS investment on productivity by using the information intensities of product and value chains of the firm in individual industries. Data showed that there is a causal relationship between IT investment and firm productivity or performance from eight industries over a 30-year period. The study showed the productivity in six out of the eight industries. Moreover, IT investment contributed positively to the productivity growth in these industries. The major contribution of this study is that it provided an explicit causality model for analyzing the relationship between IT investment and productivity/ performance. Rivard et al. [244] provided evidence that AIS improved performance by building upon the complementarity between the two perspectives (strategy as positioning and resource-based perspectives). The researchers based on a model proposed by (Spanos and Lioukas, 2001). This model encapsulates the effect of both IT support for business strategy and IT support for firm assets on firm performance. To test the model, a questionnaire was developed as a survey instrument mailed to the Chief-Executive Officer (CEO) in 96 of small and medium-sized business organizations in the province of Quebec, Canada. Results demonstrated that integrating the resource-based and competitive strategy-based views can provide further understanding of IT contribution to firm performance. Researchers recommend further research in order to understand the causal dynamics between the IT management process, the knowledge and strategic management process, and performance.

Akrash [245] discussed the impact of the quality of banking services on the relationship between service quality and performance in Jordanian banks. For the purpose of the study, a scientific methodology was developed which used a quantified approach in order to select a service quality model consisting of three parts: service quality dimensions, factors affecting its implementation, and performance of banks. Study data were collected from bank managers working at bank headquarters. Results showed that there is a positive and significant relationship between the dimensions of banking service quality and banks' performance. It also showed a significant relationship between technical quality and financial performance, ascertained by customers' measures.

Stewart [246] empirically investigates the link between the constructions of IT from perspectives. Moreover, the validity of developing path questions for predicting IT-induced business performance and strategic competitiveness is reinforced by benchmarking studies. The study was conducted on two large infrastructure projects, using AMOS 5 software to determine the significant interrelationship between the construction of IT-BSC and the

development of a robust path model. Results suggested that the framework can be used as a tool for monitoring the IT-induced value creation process. Results also indicated that organizations which implement reliable AIS systems that are well supported and user-friendly will achieve higher IT-induced performance improvement in terms of operational strategic competitiveness and other benefits. Huang and Hu [247] present a case study showing that the implementation of BSC could enhance the four key elements of IT business alignment: integrated planning, effective communication, active relationship management, and institutionalized culture of alignment. In their case study, the researchers constructed a BSC for BIOCO (a company pseudonym) using a top-down approach (corporate goal and strategies to execution of project and initiatives by individual department) to support the corporate strategies. Results indicated that BSC establishes a good working relationship between AIS and business, and BSC can successfully support the corporate goals and strategies throughout the company. The result for BIOCO was significant, particularly regarding - the four key elements of alignment resulting from the implementation of the BSC. The researchers suggest building BSC in the form of an individual BSC which can be used as a basis for an employee incentive system which will encourage him\her to contribute to company goals and objectives. Huang [248] proposes an integrated approach for the BSC tool and knowledge-based system (BSC-KBS) using the analytic hierarchy process AHP method. It also provides an intelligent KBS for strategic planning that sets or selects an organization's strategy based on the BSC perspectives. The study contributed a logical and reliable means for individual business units to describe and implement their strategic planning. It also can help to determine specific strategy weights in order to facilitate efficient automated strategic planning. The researcher suggested that the intelligent BSC-KBS model can help clients to effectively execute a strategic plan for improved business results. In the future, it should focus on implementing a BSC-KBS framework to test its effectiveness for strategic planning.

Kim et al. [249] conducted an empirical investigation intended to determine the effects of IT investment on firm performance in the electronic industries of China, and compare the results with the United States. Data was collected from 100 firms presented in an annual report. They revealed that IT investment has a positive impact on organizations' performance in China and the United States in terms of direction and the size in contrast to assertions made in previous studies and contrary to expectation. The result is significant in terms of AIS investment in developing countries. This study contributes to AIS business value literature as it is one of the first studies to assess the impact of AIS investment on company

performance in China using secondary data (from a developing country). Also, it reveals the purpose of AIS investment by Chinese electronic firms in 2004 and the positive impact of IT investment on cost efficiency.

Ciuzaitė [250] implemented the BSC in several engineering consulting companies in order to achieve efficiency and effectiveness, and to enhance the competitive position of those companies. It also aimed to provide those companies with guidelines for developing BSC by focusing on the expected theoretical and practical benefits. It also aimed to reveal the advantages of having staff consensus of BSC, by offering a rewards and incentives scheme. The study concluded that the implementation of BSC leads to substantial improvement in internal processes. It also recommended that engineering consulting companies adopt the task-oriented management method. Also, the study established that the "bottom-up" method of developing BSC is effective, since senior management anticipate that in designing the BSC, they will rely on staff views and feedback. The "top-down" method, while theoretically reasonable, is not effective, although it has been adopted by engineering consulting companies in Lithuania. In the next sub-section, the researcher discusses the approach in the literature to achieve and sustain competitive advantage in banks.

### **5.2.2 Various approaches to achieving and sustaining competitive advantage in the banking as discussed in the literature**

Shu [251] set out to enhance the understanding of the productivity paradox in the banking industry. Twelve U.S banks were involved in this study; the data was obtained directly from the banks' CIOs, and included both cross-sectional and time series data ranging from 1989-1997. They revealed that the IT plays a significant role in improving productivity and increasing profitability. They also revealed that IT is one of the positive drivers for recent productivity gains by large U.S companies. In addition, they provide an accurate methodology for measuring AIS-IT productivity. They conclude that AIS is the only input variable that provides more dollar value (profit) than the input cost on the margin when compared with expenses. Lin et al. [253] investigated whether the IT capability of a firm can create economic value, competitive advantage, and enhance profitability. They examined IT capability directly based on a cross-sectional sample of 155 banking firms and investigated the main and interactive effects of IT capability and human capital investment on five firm performance measures. Results indicated that both IT capability and human capital



investment contribute directly to the overall value creation performance of banking firms. They suggested that IT capability be considered as an integral tool for the creation of economic value and more efficient business operations instead of using it only for business infrastructure. Zwailef and Noor [254] point out the traditional performance deficiencies of an organization, focusing mainly on the measurement of financial performance. The study argues that several organizations described the philosophy and mechanism of applying the BSC, demonstrating its contribution to transforming an organization's strategy into a common language used by all staff. This was done by applying performance standards in accordance with the BSC and by examining the extent to which this BSC was used to assess the strategic performance of Jordanian banks. The researchers distributed 75 questionnaires among six Jordanian banks. The study concluded that the target banks lacked an integrated application of the BSC, as improvement did not eventuate even after this BSC was used to the fullest extent, and despite the availability of major bases to apply this system. The study revealed that the target population of the survey and several executives (personal interviews) acknowledge the importance of including non-financial measures, in addition to financial standards in performance assessment, but reported difficulties in applying the BSC system. Performance measures for the four criteria in the BSC vary from one organization to another and from one department to another at those banks, according to the banks and the nature of each department's activities. Getting a bigger share of the market, excelling in performance of internal processes compared to competitors, and developing skills of workers over the period of a strategic plan, are the strategic objectives of the target banks. Majdy and Majed [255] measured the extent to which Jordanian banks and insurance companies use BSC, and determined the relationship between strategy and the degree of competition in the markets and the degree to which BSC was used. The researchers developed a questionnaire subsequent to a literature review, using a sample of 42 banks and companies. Results showed that 40% of the sample organizations apply the BSC, albeit in different ways and that the companies' strategies and their degree of market competition are positively affected by their use of BSC. The study also concluded that managers should attempt to link KPIs with business strategy in order to increase their companies' chances of achieving their desired objectives. The researchers recommended strengthening the focus on each of the financial and non-financial KPIs when measuring their companies' performance in order to achieve competitive advantage in the market. Oliver and Fumas [256] examined the contribution of investment in AIS capital and in advertising capital to the output and profits (productivity and growth) of Spanish banks. Data was collected from 200 commercial and saving banks. Results of the study indicate that AIS capital has been the only productive asset that

increased steadily during the period 1983-2003, among the Spanish banks, while the state of the physical capital (labor) and advertising capital remained constant or decreased. No evidence was found that AIS capital increased the demand for loans or supply of deposits.

### 5.2.3 Conclusion of approaches in the literature to achieve and sustain competitive advantage

The table below is a Conclusion of the approaches to achieving and sustaining competitive advantage, according to the literature:

Table 5.1: Achieving and sustaining competitive advantage – Conclusion of the literature

<b>Researcher</b>	<b>Objective</b>	<b>What has been achieved</b>
<i>Gordon and Miller, 1976</i>	Improving the performance of AIS.	Increasing the need for more use of management accounting methods, such as dealing with non-financial data to provide more information for management on consumer trends, competitors' actions, and change factors, since the financial statements are not enough to provide such accurate and detailed information.
<i>Tomas, 1997</i>	Review the previous studies on the relationship between IT as a competitive advantage, and the performance of US industrial organizations.	This relationship does not exist, but some of these organizations were distinguished from others by their ability to make better use of human resources, which resulted in further improving the IT performance.
<i>Mahmood, 2000</i>	Examined the impact of investment in IT on the financial performance of companies.	Confirmed the necessity of having IT investments investment accompanied by investment in the organization's structure.
<i>Calderon and Kim, 2011</i>	Identified the extent of relationship between the effectiveness of the IT usage and financial returns in the business organizations of South Korea.	There is a positive relationship between IT effectiveness and the financial return for the Korean business organizations.
<i>Chenhall and Smith, 1998</i>	Examined the extent to which MIS traditional and modern methods were used by the Australian industrial facilities in practice. It also aimed to identify the characteristics of using those methods by its users, in order to encourage other businesses to apply those methods in the future. The study also aimed to test the impact of the relationship between the size of the company and the application of some advanced techniques, such as auditing standards, and performance measures, in light of adopting a set of methods and developed management concepts.	The Australian organizations generally prefer to use MIS and methods. The study suggests that those organizations use modern methods that rely on non-financial information and mostly focus on external KPIs as a benchmark, which is not applied on a large scale.
<i>Hoque et al., 2001</i>	Determined the practical impact of the relationship between each of the following independent variables:	The intensity of market competition has a direct and positive impact on the application of advanced manufacturing systems, and the use of the BSC to measure performance, as well as changes in the

	<p>1. Using the BSC.</p> <p>2. Intensity of market competition.</p> <p>3. Applied the Advanced Manufacturing Technology (AMT) on the changes in AIS (dependent variable or KPIs).</p> <p>Examined the impact of both competition and advanced manufacturing systems on using the BSC to assess performance, which subsequently affects AIS.</p>	AIS.
<i>Banker and Srinivasan, 2000</i>	Determined the extent of the impact of the non-financial measure on companies' performance.	Non-financial measure for customers' needs is adequate for predicting future financial performance, and contains additional important information related to conventional measures, in addition to improving the financial and non-financial performance as a result of implementing the plan.
<i>Reid and Smith, 2000</i>	Defined the KPIs that affect the development of AIS by examining the applied systems and modern methods.	There are significant differences in the application of AIS methods and systems among the organizations, depending on the organizational structure of the company. It also concluded the importance of KPIs in production systems, strategy and environment in the development of AIS.
<i>Lipe and Salterio, 2000</i>	Examined the impact of BSC, specifically, how this BSC that contains the KPIs can have common performance indicators for multiple units and other KPIs can be devised specifically for a particular activity.	When the odd numbers of KPIs are less than the number required to conduct the initial assessment for the activity unit, it is possible for the KPIs to have less significance in the later assessment processes for the subsequent decisions regarding the unit activity.
<i>Olson, 2002</i>	Studied the relationship between the strategy of market competence and market focus according to the four criteria used to determine balanced organizational performance.	Significant relationship between market competence strategy and market focus on the four criteria of performance assessment.
<i>Anne M., 2002</i>	Investigated the mechanism used in many of the performance perspectives in the strategy of profitability centers in the industrial companies in Australia. It is also revealed the difficulties facing managers upon dividing a group of perspectives into levels of functional operating units.	Pointed the extent to which profit centre managers experienced problems in implementing the strategy, when the applied KPIs are inadequate, especially in meeting customer needs and quality.
<i>Solano, 2003</i>	Attempted to integrate total quality management that achieves balance between the product and the effectiveness and efficiency of the production process, as a strategy used by system development organizations with BSC which achieves a balance between the dysfunctional forces that drive the organization.	The inclusion of the total quality management model in facilities that develop computer systems using the BSC model is shown by combining both business operations and product quality, and its various other aspects.
<i>Ittner et al., 2003</i>	Empirically investigated the relationship between strategic performance measurement particularly the BSC, and the economic values measurement and actual financial outcomes	Organizations that more extensively use a broad set of financial and non-financial measures have higher measurement system satisfaction and stock market returns than those organizations with similar strategies or value drivers. The result also suggests that the BSC and economic values

	(accounting and stock returns), by comparing their relative ability to explain firm performance, using data from 140 U.S financial services firms.	measurement as causal business models are associated with higher measurement system satisfaction.
<i>Stewart and Mohamed, 2003</i>	Built a BSC framework to evaluate the value that IT adds to the process of project information management in large construction in Australia	A significant result showing that the operational perspective is the most important perspective, but that all perspectives are necessary to holistically evaluate the value that IT adds to the process.
<i>Strandholm, and Kamalesh, 2003</i>	Determined the difference between the use of organization's environment analysis and the extent of AIS usage by small and large hospitals, and its impact on competitive advantage.	There is a positive relationship between the practice of analyzing the environment and the advantage of the available AIS and business organizations' performance in general. The study also revealed that small organizations are less frequently using the AIS and environment analysis method than are the large organizations, which negatively affects their competitive advantage.
<i>Sohn, 2003</i>	Defined the relationship between company strategy and environmental forces BSC-KPIs.	The difference in continuity types and environmental conditions affect the significance of KPIs performance assessment.
<i>Alsheikh, 2004</i>	Identified the level of AIS use in achieving the competitive advantage of Jordanian pharmaceutical companies and the relationship between the business organizational and technical requirements for AIS and competitive advantage.	AIS contributes to achieving competitive advantage through its impact on product quality, performance, control of markets, innovation, development and efficiency of operations.
<i>Ax and Bjorrenak, 2005</i>	Explored the way that the BSC is communicated to potential adopters in Sweden; they identified the origin of the elements that are linked to BSC in the communication process. To the study also discussed and analyzed the role played by these elements in the dissemination process. The study covers the period 1992-1999 which was a period of rapid growth of the dissemination of the BSC in Sweden.	The bundling of the BSC with other ideas could be seen as a fashion-setting process that affects the transmission of the BSC in Sweden.
<i>Turner et al., 2005</i>	Designed a performance management system with appropriate AIS. It also aimed to implement and assess the impact of this technique on management and business then identify factors supporting it that were affecting management and business.	The technique should bring improvements in identifying business weakness, facilitating continuous improvement, increasing transparency and visibility and increasing positive behavior.
<i>Hu and Quan, 2005</i>	Explored the casual relationship between IT and firm productivity/ performance, by using Granger causality model to test the exact nature of the strong correlation between IT investment and productivity. Furthermore, the study measured the impact of IT investment on productivity by the information intensities of product and value chains of the firms in individual industries.	There is a causal relationship between IT investments from eight industries over a 30-year period. The study revealed productivity in six out of the eight industries. Moreover, IT investment contributed positively to the growth of productivity in these industries. The major contribution of this study is that it provided an explicit causality model for analyzing the relationship between IT investment and productivity/ performance.

<i>Rivard et al., 2006</i>	Provided evidence about the contribution of AIS to firm performance by building upon the complementarity between the two perspectives (strategy as positioning and resource-based perspective).	The integration of resource-based and competitive strategy-based views can provide further understanding of AIS contribution to firm performance.
<i>Akrash, 2007</i>	Discussed the impact of applying the quality of banking services on the relationship between service quality and performance in the Jordanian banks.	There is a positive and significant relationship between the dimensions of banking service quality and banks' performance. It also showed that there is an impact on the relationship between technical quality and financial performance, as determined by customers' measures.
<i>Stewart, 2007</i>	Empirically investigated the link between the constructions of IT-BSC perspectives. Moreover, the validity of developing path questions for predicting AIS induced business performance and strategic competitiveness is reinforced by benchmarking studies.	The framework can be used as a tool for monitoring the IT-produced value creation process. Results also indicated that organizations which implement reliable IT systems that are well supported and user-friendly will achieve higher IT-driven performance improvement in terms of strategic operational competitiveness and other benefits.
<i>Huang and Hu, 2007</i>	Presented a case study in which four key elements of IT business alignment- (integrated planning, effective communication, active relationship management, and institutionalized culture of alignment) could be enhanced by implementing the BSC.	BSC establishes a good working relationship between AIS and business, and BSC can successfully support the corporate goals and strategies throughout the company.
<i>Huang, 2009</i>	Proposed an integrated approach for the BSC tool and knowledge-based system (BSC-KBS) using the analytic hierarchy process (AHP).	Contributed in providing a logical and reliable means for individual business unit to described implements their strategic planning. It also can help to determine specific strategy weight in order to facilitate efficient automated strategic planning. The researcher recommended that the intelligent BSC-KBS model can help clients effectively execute a strategic plan for improved business results. In the future, it should focus on implementing a BSC-KBS framework to test its effectiveness for strategic planning.
<i>Kim et al., 2009</i>	Investigated the effect of IT investment on firm performance in the electronic industries of China and compared these with the United States.	IT investment has a positive impact on organization's performance in China and the United States in terms of direction and size, contrary to the assertions made in previous studies and against expectations. This result is significant in terms of IT investment in developing countries.
<i>Jakobsen, 2008</i>	Applied the BSC in the engineering consulting companies in order to achieve efficiency, effectiveness and enhance the competitive position of those companies. It also aimed to provide those companies with guidelines for developing BSC by focusing on the expected theoretical and practical benefits. It also aimed to achieve staff consensus regarding the use of BSC by offering rewards and incentive schemes.	The engineering consulting companies adopted a task-oriented management method. Also, the use of "bottom-up" in developing BSC is an effective method, since senior management prior to designing the BSC invite staff input and feedback. Using the "top-down" method is theoretically reasonable but is not effective, although it is used by engineering consulting companies in the Lithuania.
<i>Shu and Strassmann, 2005</i>	Enhanced the understanding of the productivity paradox in the banking industry.	IT plays a significant role in improving productivity and increasing profitability. Moreover, IT was one of the positive drivers of

		recent productivity gains by large U.S companies.
<i>Lin et al., 2007</i>	Investigated whether the IT capability of a firm can create economic value, competitive advantage, and enhance profitability.	Both IT capability and human capital investment contribute directly to the overall value creation of banking firms.
<i>Zwailef and Noor, 2005</i>	Applied performance standards using the BSC and examined the extent to which this BSC was used to assess the strategic performance of Jordanian banks.	The target banks did not integrate BSC in their operations.
<i>Majdy and Majed, 2008</i>	Measured the extent to which Jordanian banks and insurance companies use BSC, and determined the relationship between strategy and the degree of competition in the markets and the degree of use BSC.	Of the sample, 40% are applying the BSC, but in different ways. A company's strategy and its degree of market competition is affected positively by the use of BSC. The study also concluded that managers should take more interest in linking KPIs with business strategy to increase and strengthen the capacity of their companies to achieve the desired goals.
<i>Oliver and Fumas, 2008</i>	Investigated the contribution of investment in AIS capital and in advertising capital to the output and profits (productivity and growth) of Spanish banks.	AIS capital has been the only productive asset that increased steadily during the period 1983-2003, among the Spanish banks, while physical capital (labor) and advertising capital remained constant or decreased. No evidence was found that AIS capital increased the demand for loans or supply of deposits.

In the next section, the researcher discusses the existing approaches in the literature that attempt to produce models that provide comprehensive information to various stakeholders.

### 5.3 Providing comprehensive information to Stakeholders

Providing comprehensive information to stakeholders in business organizations and banks will be discussed as illustrated in Figure 5.3 below.

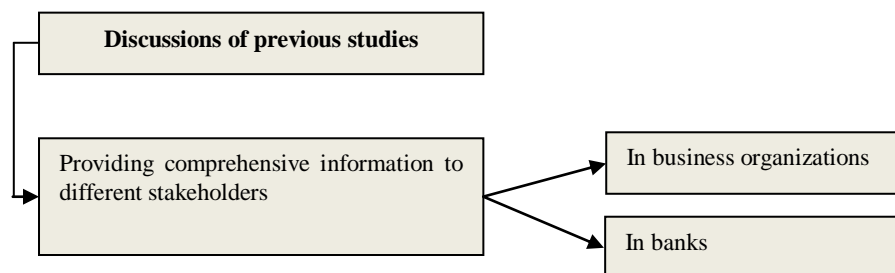


Figure 5.3: Providing comprehensive information to different stakeholders

### **5.3.1 Literature review: approaches to providing comprehensive information to different stakeholders in business organizations**

Kaplan's [157] study, conducted on a sample of (12) American companies, is one of the first studies to use the BSC to assess companies' performance. The researchers explained a modern management method to measure and assess companies' performance according to four dimensions, namely: financial, consumer, internal operations, learning and growth. The most significant results of the study show that BSC can provide appropriate information to assist management in making its various economic decisions, and is considered as a comprehensive financial and non-financial system for measuring performance. Also, the study by Kaplan and Norton [218] involved an empirical analysis of the effect that the use of BSC has on overall performance. It focussed on the selection of financial and non-financial measures and the various departments' interest in these, and the interrelationships between these measures. The study concluded that the BSC system is the heart of the administrative system MIS and not just a measurement system for overall performance, as it incorporates all aspects of financial and non-financial performance. Thus, the BSC system shifted from being a performance measurement system to a strategic management system, since it sends signals to each of the departments and employees and has a term-t impact; moreover, it provides a more detailed measurement of performance. Kaplan and Norton [257] intended to show why the managers of business organizations and companies need to use and apply the BSC. This is an in-depth study that provides compelling reasons for adopting the BSC by companies. The results of the study complemented those of the previous studies of the same researchers, and contributed to the further development, understanding and application of BSC.

Choe [258] concluded that there is a correlation between AIS and the factors affecting it such as users' participation, the capabilities of system users, size of the organisation, training and education of users. This relationship is affected by the system's level of development and these factors should be studied according to their degrees of importance and the level of development of the system. The relationships between the influencing factors and the information systems' (IS) performance in terms of IS evolution were not empirically examined. Studies did not consider the evolution level of IS when examining the factors that influence IS performance. They have tried to identify critical influence factors without considering the state of the IS and the IS department, i.e., the extent of IS evolution. The objective of this study was to examine the direct relationships between the influencing factors and the performance of accounting information systems AIS and identify the

moderating effect of the evolution level of IS on the relationships. This study hypothesized the direct relationships and the moderating effect of the evolution level of IS. Frigo [259] pointed out the extent of impact of the BSC's four perspectives in implementing the vision and strategy of local banks in the United States of America, through the following three steps: 1- Comprehensive identification for the bank's strategy. 2- Comprehensive identification of KPIs used in the bank. 3- Develop the strategic objectives and performance measurement in the form of BSC model. The study emphasized the significance of formulating a comprehensive strategic analysis for the bank in order to emphasize the current strategies and develop additional strategies. The strategic analysis helped management to identify the strategic goals and objectives for the four perspectives of the BSC model. Ittner [260] measured the development in financial performance associated with the use of an Activity-Based Costing (ABC) system and the possible conditions, which include the synchronized application of other initiatives, which have brought benefits to the organization upon applying it. The study concluded that: 1- The existence of positive cooperation obtained through the synchronized application of initiatives with the ABC model, and this result confirms the findings of researchers regarding the necessity of having an efficient AIS to support the organization's operational activities, and ensure satisfaction and benefits. 2- The established KPIs contributed to the success of the ABC model, all of which are indications of improvement in financial performance. Figg [261] pointed out the significance of using BSC to measure and assess the overall performance of several major companies in USA, and extracted five performance measures used by companies, namely: customer satisfaction, operational efficiency, job satisfaction, financial management, administrative innovation and learning. The study used KPIs especially designed for special administrative innovation and learning, where the learning and growth dimension included staff satisfaction, training and education.

Germbergen and Bruggen [262] propose an evaluation framework for the IT function based on the BSC technique, IT-BSC model, since evaluation domains were identified and supplied with adequate KPI measures, (business contribution, user orientation, operational excellence, and future orientation) of IT. The study focuses on assessing the general AIS function and addresses crucial questions such as: How good is our corporate IT? How can we measure this function? How can we improve it? They follow up these three issues in order to develop an IT-BSC that is built on a cause-and-effect relationship, includes sufficient performance and drivers, and links to financial measures. They provide evidence that such a tool can offer practical assistance to both general management and IT



professionals. Results also indicate that the established BSC's evaluation of IT integration in terms of efficiency is typically dealt with in the domain of operational excellence while effectiveness is evaluated in the domain of business contribution and user orientation. Lawrie [263] explored the possibility of combining KPIs with the BSC perspectives, to guide the behaviour of strategic management. The study concluded that the use of the two models together will provide a measuring instrument that can be effectively used to drive institutional change and improve performance. The study by Lipe [233] aimed to examine the effect of BSC, particularly when it integrated KPIs that could be applied generally to ascertain the performance of multiple units, and other KPIs designed specifically for a specialised activity unit. The main result of the study is that when the number of the individual KPIs is less than the number necessary to conduct the initial assessment of the unit's activity, it is possible to reach these KPIs to less weight in the evaluation process for the subsequent decisions and unit activity. Grembergen and Saull [264] endeavored to develop and implement IT-BSC within an information service division serving a Canadian financial group. The researchers illustrated the relationship between the IT-BSC and the BSC in detail, the AIS development BSC and the (IT operational BSC), since both are facilitators of the BSC. This cascade of BSC becomes a linked set of IT measures that are instrumental in aligning AIS and business strategy. Results showed that such cascade (BSC) will help to determine how business value is created through IT.

Norrie and Walker [265] investigated the possibility of using BSC to improve the performance of operations teams in a telecommunications company operating in the northern part of the USA. Results confirmed the benefits of applying BSC as an instrument to improve the performance of a project. The study revealed that KPIs-BSC measurements are important tools to establish and build projects that require their own individual strategy. The study highly recommended the use of BSC since it translates the strategy into operational plans and measurements, which will guide the company in the implementation of its strategic plans. Bell and Elkins [266] conducted a study in the USA which was intended to show that KPIs together with the four dimensions of BSC (financial, internal operations, customer, growth and learning), can reflect the obvious impact of effective leadership. The researchers stress the significance of the BSC, and confirm that financial measures and procedures should not be the only important measures determining an organization's efficiency, but that the BSC focuses on the effectiveness of the management

system as well. Consequently, there are four significant factors indicating an organization's success: growth and learning, internal processes, customer, financial, in addition to leadership, which altogether constitute the BSC. The study concluded that leaders must develop a BSC or a monitoring system (Radar Scope), which continuously reflects the four basic criteria mentioned earlier, which greatly determines the effectiveness of the leader in achieving the organization's objectives.

Valiris et al. [267] addressed the problem of choosing KPIs and suggested the use of a multi-standard approach to address the problem more effectively. The study examined KPIs frameworks currently being used in designing performance measurement systems, their application, and in the decision-making processes. The most significant outcome of the study is that it provided a specific measurement framework that assists decision makers with their KPIs selection process so that a specific measurement standard is established, as is the case with other measures. Ittner and Larcker [237] investigated the different types of KPIs used by various companies. The sample for the study comprised 296 executive managers in companies operating across more than sixty various business sectors, either industrial or service-oriented. The study concluded by identifying some of the reasons that lead to errors in evaluation and measurement, including:

1. Using new models such as the BSC model.
2. Lack of ability to translate the non-financial performance into quantified and financial KPIs.

The study suggested conducting a frequent review for the BSC model from time to time.

Rodnor [268] identified and described the performance measurement systems applied in the public sector, specifically the health sector, before focusing on a specific BSC method. It also aimed to test the related ideas in the public sector, especially the health sector. After evaluating other models, the main recommendation of the study for public-sector enterprises is to consider the BSC as one of the possible options in order to improve performance. Alan and Shenhar [269] pointed out that there is a problem facing the managers of different companies regarding the measurement of strategic performance. The study used the BSC to measure and assesses performance using non-traditional methods. The study proposed twelve basic KPIs to ascertain performance and success in five areas: financial, market, operations, people, future. These indicators can be viably applied and tested by various companies or units, since they are most probably included in other models that measure and

evaluate performance, especially the BSC method. But it was distinguished by assigning a single KPI for 'future'.

- a. Matthew [270] tested the impact of strategic performance measurement systems on the managers' role, psychological support, job satisfaction and management performance. For this study, 83 strategic unit managers of manufacturing companies in Australia were surveyed. In order to implement AIS applications, a strategic performance measurement system must be comprehensive. The results of this study revealed that the strategic performance measurement system is not directly linked to management performance, but has a positive indirect relationship with management performance through psychological support. Results also indicated that: The strategic performance measurement system is positively related to all four dimensions of psychological support (meaning, competence, self-determination, and impression).
- b. Comprehensiveness of strategic performance measurement system helps to provide information on performance, as it provides psychological support to managers, and predict their expectations that improve managerial performance in return.

AbdulLatef and Hanan [132] suggested that the BSC is one of the modern strategic tools for measuring and evaluating performance in a comprehensive manner because it includes both financial and non-financial measurements, and all the factors that determine the performance of the organization. Thus, the BSC is used with the intention of developing an action plan and new goals, and translating the company's strategy into an action plan that takes into account the three dimensions of time (past, present and future). The main recommendations of the researchers was that this technology be used by local companies, as well as by service organizations such as hospitals and government departments, since it has advantages as a measurement tool that can evaluate performance in a comprehensive manner, and can be used in various departments and units. Michalska [271] empirically explored several problems encountered when estimating enterprise effectiveness and its production process. So, the researcher presented BSC as one of the approaches that can be used to ascertain the effectiveness of the whole organization and introduced it as a technological process, which should be implemented in the organization for reasons of product quality, costs, productiveness of market requirements and growth differentiation. The researcher introduced the BSC in a Polish metallurgical company as a method of integrating strategic thinking with the daily activities of the organization. Results showed that the BSC is a useful tool that can support management processes and is unique because it:

1. aligns all workers with the strategy envisioned by the whole organization; and
2. It enables an estimation to be made of the extent to which the strategy is effective, and not just in terms of financial results.

These advantages encourage firms to implement the BSC model.

Ongowarsito [272] used IT-BSC as a way of assuring IT governance and achieving the integration of business and IT decisions. The main objectives of this study were to:

- a. determine the performance of the AIS division of Ploypet Karyapersadu Company by means of the four criteria of the BSC;
- b. define the measurement KPIs for the IT division; and
- c. provide top management with crucial control measures for the IT division.

The results show that the BSC is a management and measurement system that is very suitable for supporting the AIS governance process and the IT business alignment process. Furthermore, it was evident that IT-BSC was an acceptable method of assuring IT governance and achieving the integration of business and AIS decisions. In order for more effective strategic alignment to occur, the following recommendations should be considered:

- Top-level management teams must become and remain involved in communicating, illustrating, and reinforcing the value result of IT business alignment using market product and other information results.
- Top level management in the IT division should also be involved in educating as well as working with project level teams to educate, reinforce and reward business organization unit/division and group efforts, and produce results that align and implement IT business enterprise strategy and increases their level of involvement.

Wing et al. [273] investigated the extent to which a performance evaluator uses the BSC to differentiate between top management (Raters) and the divisional managers' (Ratees) conflicts, and the degree to which the BSC performance evaluation tool is used to assess the effectiveness of strategy in influencing the performance of divisional managers. The researchers used 63 MBA students in a Chinese university to conduct an evaluation of two divisional managers. They concluded that the unique features of the BSC do not reduce

selective attention biases that presumably lead to conflict between the rater and ratees. So, in order to reduce the top management bias, the effectiveness of the BSC as a strategic management system must be improved. Kim et al. [249] developed a performance evaluation structure for an AIS department based on a Fuzzy Analytic Hierarchy Process (FAHP) integrated with the concept of the BSC to solve the strategic process problem in the manufacturing industry in Taiwan. They empirically investigated their developed model. The result showed that the BSC with FAHP as an integrated model will have a positive effect on solving the strategic problem process that might occur in the AIS department. Patel et al. [274] developed a methodology to show the cause-and-effect relationship between the components of a performance rating system in the National Health Service (NHS). They investigated the opposing views of those against the system and those who supported it, by constructing the NHS-BSC model. They used a Causal-Loop Diagram (CLD) to show how indicators interact to evaluate an NHS performance system. This approach provides a holistic view of the performance system and reduces the conflict between the different views regarding the NHS performance-rating framework. They concluded that the BSC is a useful strategic tool that links various performance indicators to performance management activities/processes in an organization. Judah's [275] study investigated the impact of BSC on the institutional commitment of the workers in Jordanian aluminium companies, and ascertained the impact of demographic factors at the institutional commitment level. The study revealed that the evaluation process does have an effect on the institutional performance at those companies, but its influence is greater in those companies that apply a BSC system. However, the impact of demographic factors is low at the institutional commitment level of those companies. Al Sawalqa [207] established a mechanism for applying BSC in Jordanian industrial companies as a model to analyse BSC in the developing Middle Eastern countries. The study covered a sample of 168 medium-sized and large companies. The study concluded to that 30% of these companies are using BSC to assess performance. Some variations were revealed between these companies; these were related to the adopted perspectives, with more emphasis on the four basic perspectives adopted by Kaplan and Norton.

### **5.3.2 Literature review: approaches to providing comprehensive information to different Stakeholders In banks**

Khatab [276] analysed the factors affecting the efficiency of accounting information systems in the Jordanian banks by measuring the impact, on the efficiency of these systems, of the

behavioural, organizational, environmental factors and models used for management decisions. The study concluded that there was a relationship between the efficiency of AIS and all the factors under consideration. The work of Wu et al. [277] attempted to identify the relative significance of each of the areas of the BSC used for measurement purposes, and to determine the relative significance of each of the areas of BSC in terms of performance, enabling a comparison of departments according to these standards. The study built a model to assess banks' performance, based on the characteristics of the financial sector which was taken from the four perspectives of the BSC (financial, customers, internal processes, growth and learning). The model was applied to 19 respondents from four banks in Taiwan which specialized in wealth management. A model was built to assess the overall performance of private banks in wealth management using the AHP, which determined the relative importance of the four perspectives in the BSC based on the respondents' answers and their link with the remaining answers. Also, this process identified the critical measures used for each of the perspectives. The findings of this study indicate that use of AHP helps administration to overcome the difficulties of applying the BSC, one of which is determining the relative importance of each of the system perspectives. The use of an analytic hierarchy also assists decision-makers to make rational choices based on quantitative measures that omit personal diligence. This model is simple to understand and use, and is able to measure both quantitative and qualitative phenomena.

Stemsrudhagen [278] identified the degree to which a performance measurement system used in Norwegian manufacturing industries has the properties prescribed by the BSC. Data was collected from 83 Norwegian manufacturing companies. The result showed that the commonly-used structures of performance measurement system consist of many measures (financial and non-financial) which have been found in BSC. The author provided some empirical evidence that the structure of BSC retains its relevance when performance measurement systems are seen as an anomalistic phenomenon. Interestingly, the author supported the use of AIS in performance measurement in this statement: "Today's technological possibilities are limitless in terms of creating seamless information system networks and multimedia terminals for supporting manager's enactment". Dergham and Abufeddah [279] was conducted to determine the impact of applying the four criteria of the BSC model (financial, customer, internal processes, growth and learning) (on the strategic financial performance of Palestinian national banks working in the Gaza Strip. One of the main results of the study was that work should be vigorous and serious to enhance the strategic financial performance. Each of the four aspects of the BSC model can be used

separately to enhance the strategic financial performance of banks. The study recommended the creation of a particular environment that would facilitate the implementation of a BSC to train and rehabilitate bank employees. The study also recommended attracting qualified staff with technical expertise capable of establishing the BSC efficiently and effectively in banks. Dudin [280] identified the obstacles that prevent employees in Jordanian commercial banks from accepting the use of BSC. The study revealed that factors that present obstacles relate to planning, information, financial issues, management, rehabilitation, education, technical systems, and jurisprudence and that there is a close correlation between the existence of these constraints and applying poor acceptance of the BSC. The study also recommended that the Central Bank of Jordan and the Association of the Jordanian Banks should encourage commercial banks to use the BSC, and points out the advantages of using this BSC to improve performance and achieve strategic objectives. Sabah [205] clarifies the concept of BSC and its application mechanism for large banks in Iraq by using the Kaplan and Norton method, based on the data available from these banks. It used financial and non-financial KPIs-BSC to measure the performance of these banks from 2006-2009. In addition, Sabah [60] emphasized the significance of using BSC to measure performance in order to achieve the strategic vision, and recommended that other banks in the region also use the BSC.

### 5.3.3 Literature Conclusion: Approaches to providing comprehensive information to different stakeholders

The table below summarizes the various approaches to providing comprehensive information to different stakeholders as presented in the literature.

Table 5.2: Approaches to providing comprehensive information to different stakeholders – Conclusion of the literature

Researcher	Objective	What has been achieved
<i>Kaplan and Norton, 1992</i>	Explained a modern management method that measures and assesses companies' performance in terms of four dimensions namely: financial, consumer, internal operations, learning and growth.	BSC provides appropriate information to assist management in making its various economic decisions, and is considered as a financial and non-financial comprehensive system to measure performance.
<i>Kaplan and Norton, 1993</i>	Conducted an empirical analysis of applying BSC for the comprehensive performance in three companies	BSC system is the heart of the MIS administrative system and is not just a measurement system for overall performance, as it incorporates all aspects of financial and non-financial performance.
<i>Kaplan and Norton, 1997</i>	Pointed out why business organizations and company managers need to use and apply the BSC.	Complemented the previous studies by the same researchers, and added to the further development, understanding and application of the BSC.

<i>Choe, 1996</i>	Examined the direct relationships between the influencing factors and the performance of AIS, and identified the moderating effect of the level of evolution of IS on the relationships.	There is a correlation between AIS and the factors affecting it such as users' participation, capabilities of system users, size of the organisation, training and education of users.
<i>Frigo et al., 2000</i>	Pointed out the extent of the impact of the BSC's four perspectives on implementing the vision and strategy of local banks in the United States of America.	The study emphasized the significance of formulating a comprehensive strategic analysis for the bank, in order to evaluate the current strategies and develop additional strategies if necessary. The strategic analysis helped management to identify the strategic goals and objectives according to the four perspectives of the BSC model.
<i>Ittner, 2002</i>	Measured the development in financial performance associated with the use of activity-based costing (ABC) the system and the possible conditions, which include the synchronized application of other initiatives which have brought benefits to the organization following their application.	1- The researchers confirmed that positive cooperation could be obtained through the synchronized application of initiatives with the ABC model, and this result confirms the findings of researchers regarding the necessity of having efficient AIS to support an organization's operational activities and yielding benefits. 2- The KPIs used here contributed to the success of the ABC model; all the indicators showed improvement in the financial performance.
<i>Figg, J., 2000</i>	Developed the BSC and examined the benefits of BSC for companies.	Pointed out the significance of using BSC to measure and assess the overall performance of several major companies in USA, and extracted five performance measures used by companies, namely: (customer satisfaction, operational efficiency, job satisfaction, financial management, administrative innovation and learning).
<i>Germbergen and Bruggen, 1997</i>	Proposed an evaluation framework for the IT function based on the BSC technique, IT-BSC model, since evaluation domains were identified and supplied with adequate measures KPIs, (business contribution, user orientation, operational excellence, and future orientation) of IT.	The BSC evaluation of IT integration in terms of its efficiency is typically dealt with in the domain of operational excellence while effectiveness is treated in the domain of business contribution and user orientation.
<i>Lawrie, 2001</i>	Explored the possibility of combining KPIs with the BSC perspectives, to guide the behaviour of strategic management.	The two models together will produce a measuring instrument which can provide a solid basis to promote institutional change and improve performance.
<i>Lipe, 2001</i>	Examined the effect of BSC, specifically, how this BSC contain the KPIs to measure performance common to multiple units, and other KPIs that are specific to a specialised activity unit.	When the number of the individual KPIs is less than the number necessary to conduct the initial assessment of the unit's activity, it is possible to assign less weight to these KPIs in the evaluation process for the subsequent decisions and unit activity.
<i>Grembergen and Saull, 2001</i>	Developed and implemented AIS-BSC within the information service division serving a	BSC can help to determine how business value is created through IT. Also, results indicated that the design



	Canadian financial group.	and implementation of such a BSC in a project would need substantial human and financial resources.
<i>Norrie and Walker, 2004</i>	Investigated the possibility of using BSC to improve the performance of operations teams in a telecommunications company operating in the northern part of the USA.	The KPIs-BSC measurement tools are important in establishing and building projects that require their own strategy.
<i>Bell and Elkins, 2004</i>	Emphasized the importance of having a set of KPIs, pointing out that the BSC with its four dimensions (financial, internal operations, customer, growth and learning) reflect the obvious impact of effective leadership.	Leaders must develop a performance BSC or a monitoring system (Radar Scope), which continuously reflects the four basic criteria mentioned earlier, which greatly affects the success of the leader in achieving the organization's objectives.
<i>Valiris et al., 2005</i>	Addressed the problem of choosing KPIs, and suggested a multi-standard approach to address the problem more effectively.	Provided a specific measurement framework that guides decision makers in their KPIs selection process, so that a specific measurement standard is established, as in other measures.
<i>Ittner And Larcker, 2003</i>	Identified the different types of KPIs used by various companies.	Identified some of the reasons that lead to errors in evaluation and measurement, including: 1- Using new models such as BSC model. 2- Lack of ability to translate the non-financial performance into quantified and financial KPIs.
<i>Rodnor, 2003</i>	Identified and described the performance measurement systems applied in the public sector, specifically the health sector, before focusing on a specific BSC method; tested the related ideas in the public sector, especially the health sector.	After evaluating other available models, the researchers recommended that public-sector enterprises should consider the BSC as a possible option.
<i>Alan and Shenhar, 2003</i>	Pointed out that there is a problem facing the managers of different companies regarding the measurement of strategic performance.	The study established twelve basic KPIs to cover five major dimensions of success: (financial, market, operations, people, future), which can be viable for application and testing in various companies.
<i>Matthew, 2004</i>	Tested the impact of strategic performance measurement systems on clarifying managers' role, psychological support, job satisfaction and management performance.	A strategic performance measurement system is not directly linked to management performance, but has a positive indirect relationship with management performance through psychological support. Results also revealed that: a. The strategic performance measurement system is positively related to all four dimensions of psychological support (meaning, competence, self-determination, and impression). d. Comprehensiveness of strategic performance measurement system helps to provide information on performance, as it provides psychological support to managers, and

		predict their expectations that improve managerial performance in return.
<i>AbdulLatef and Hanan, 2005</i>	Developed an action plan and new goals, and translate the company's strategy into action plan, taking into account the three dimensions of time (past, present and future).	BSC is one of the modern strategic tools for measuring and evaluating performance in a comprehensive manner, including financial and non-financial measurements, by using the criteria that are important for the performance of the organization.
<i>Michalska, 2005</i>	Empirically explored several problems related to the estimation of enterprise effectiveness and its production process.	BSC is a useful tool for supporting management processes, and this tool is unique for two reasons: 1- It aligns all employees with the strategy of the whole organization. 2- It enables a company to estimate the degree to which its strategy is being realized, and that this can be accomplished by considering more than just the financial results.
<i>Ongowarsito, 2007</i>	1. Evaluated the performance of the AIS division of the Ploypet Karyapersadu Company using the BSC method covering four perspectives. 2. Defined the measurement KPIs of AIS division. Provided the top management with crucial control measures for the IT division.	BSC is a management and measurement system that is very suitable for supporting the IT governance process and the AIS business alignment process. Furthermore, it showed the effective use of IT- BSC as a method of assuring IT governance and achieving the integration of business and IT decisions.
<i>Wing et al., 2007</i>	Investigated the extent to which a performance evaluator uses the BSC to differentiate between top management (Raters) and the divisional manager (Ratees) conflicts, and the degree to which the BSC performance evaluation tool is used to assess the significance of strategy effectiveness in influencing the performance of divisional managers.	Unique features of the BSC do not reduce selective attention biases that presumably lead to conflict between the rater and ratees. So, in order to reduce the top management bias the effectiveness of the BSC as a strategic management system must be improved.
<i>Kim et al., 2008</i>	Developed a performance evaluation structure for an IT department based on a fuzzy analytic hierarchy process (FAHP) integrated with the concept of the BSC to resolve the strategic process problem in manufacturing industries in Taiwan.	BSC with FAHP as an integrated model can help to resolve the strategic problem process that might occur in an IT department.
<i>Patel et al., 2008</i>	Investigated the split between opposition and supporters views of this system, by constructing the NHS-BSC model.	BSC is a useful strategic tool that links various performance indicators to performance management activities/processes in an organization.
<i>Judah, 2008</i>	Studied the impact of BSC on the institutional commitment of the workers at the Jordanian Aluminium companies, in addition to defining the impact of demographic factors at the institutional commitment level.	The evaluation process has an effect on the institutional performance in those companies, but this influence is greater in those companies that apply the BSC system, while the impact of demographic factors is low in terms of the institutional commitment level of employees in those companies.

<i>AlSawalqa, 2011</i>	Analysed the mechanism of executing BSC in Jordanian industrial companies.	30% of these companies are using BSC to assess performance. Some variances related to the adopted perspectives were revealed between these companies, with more emphasis on the four basic perspectives adopted by Kaplan and Norton.
<i>Khatab, 2002</i>	Analysed the factors affecting the efficiency of accounting information systems in the Jordanian banks by measuring the impact of the behavioural, organizational, environmental factors and models of management decisions on the efficiency of these systems.	There was a relationship between the efficiency of AIS and all the factors that were considered.
<i>Wu et al., 2008</i>	Assisted in identifying the relative significance of each of the areas of the BSC for measurement, and in determining the relative significance of the performance of each of the areas of BSC, enabling departments to be compared according to these standards.	AHP helps the administration to overcome the difficulties of applying the BSC especially the difficulties of determining the relative importance of the system perspectives. Using analytic hierarchy also assists decision makers in rational decision-making based on quantitative measures that do not take into account personal diligence.
<i>Stemsrudhagen, 2003</i>	Studied the degree to which performance measurement system (PMS) used in Norwegian manufacturing industry has the properties prescribed by the BSC.	Commonly-used structures of PMS consist of many measures (financial and non- financial) which have been found in BMS. Supported the use of (AIS) in performance measurement. Stated that "Today's technological possibilities are limitless in terms of creating seamless information system network and multimedia terminals for supporting manager's enactment".
<i>Dergham and Abufeddah, 2009</i>	Determined the impact of applying the BSC model, from its four perspectives: (financial, customer, internal processes, growth and learning), in enhancing the strategic financial performance of Palestinian national banks working in the Gaza Strip.	Work should be vigorous and serious to improve strategic financial performance. Each of the four aspects of the BSC model can be used separately to enhance the strategic financial performance of banks.
<i>Dudin, 2009</i>	Set out to identify the obstacles that prevent the use of BSC in Jordanian commercial banks from the perspective of workers.	Obstacles lie in the (planning, information, and financial, management, rehabilitation, education, technical, and jurisprudence factors), and there is a close correlation between the existence of these constraints and the low level of applying the BSC.
<i>Sabah, 2012</i>	Realized the concept of BSC and the mechanism of its application in large banks in Iraq by using Kaplan and Norton method, based on the data supplied by these banks.	Examined financial and non-financial KPIs-BSC that measure those banks' performance during the period 2006-2009. In addition, the study revealed the significance of applying BSC in measuring performance and achieving the strategic vision. The study also emphasized the importance of other banks in the region using BSC.

In the next section, the researcher discusses the existing approaches in the literature that specifically address the issue of providing comprehensive information to different stakeholders.

## 5.4 Importance of AIS in improving the efficiency of Internal Control Systems

The importance of AIS as a means of improving the efficiency of internal control systems in business organizations and banks will be discussed as illustrated in Figure 5.4 below.

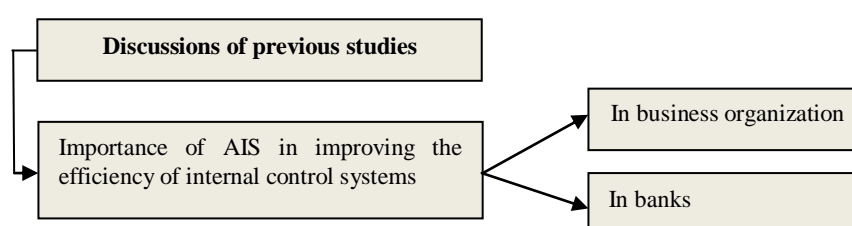


Figure 5.4: AIS discussion plan

### 5.4.1 Literature review: The importance of AIS in improving the efficiency of Internal Control Systems in business organizations

The study by Albrecht et al. [281], is one of the earliest works in this area. This study examined ways to assess the performance of internal control departments, in eighteen of the most powerful U.S. companies. The study targeted companies that have departments of successful internal control and analysed the views of executives and financial officers, and members of the oversight committees of such companies. The researchers examined the KPI used by internal auditing departments to assess meaningful results, recommendations, skills, assessing the external auditor of the department's internal control accounts, avoid surprises, stick to the plan and method of audit, development of staff, number of times of internal auditing, impact of internal accounting control cost, audit manager reports, and assessment of the audit committee and senior management of the internal auditing department. The study found that although many companies tend to assess internal control departments by analysing the costs and measurable benefits achieved by such departments, the administration's commitment to internal control, cost their planned budget planning of the organization, does not provide sufficient objective evidence about the efficiency and success

of the internal control department which carries the greater burden of responsibilities, and cannot not be relied upon as a sole measure to assess the performance of the internal control department. Tayles and Drury [282] conducted a wide field study aimed to identify the practicality of applying modern AIS methods derived from theoretical studies. It also aimed to identify the progress of this application, determine the most important and applied methods in control, assessment of capital spending, determine cost, and measure performance. This study focused on the radical changes facing British manufacturing companies in terms of its processes and the level and nature of competition. Hence, the study examined the methods and systems used in these companies, as described by its accountants and the extensive use of advanced manufacturing technology systems. The study revealed the importance of accountants' participation in the planning and design stages of product development, especially in those companies using advanced manufacturing systems, in order to control and determine the significance of using non-financial measures.

Liberatore and Miller [283] developed a framework to integrate a system of activity-based costing with the BSC system, to achieve strategic logistic support and develop a monitoring process. The study revealed that these two systems can complement each other to achieve all of a company's overall goals or objectives. It also revealed that the overall performance measurement system, according to the BSC, could be used as a tool to monitor the strategic channels. The study also suggested a model that basically depends on the AHP technology, to facilitate the logical and relative linkage between KPIs and the overall mission, goals and distinctive strategies, such as the strategies of distribution channels. Rezaee and Reinstiem [284] examined the impact of technological tools and their related systems on the performance of accountants, the development of work tasks, and improved production efficiency. The study analysed 30 relevant studies conducted in the USA, and concluded that all of these studies agree on the need to use the latest technological systems in internal auditing processes, since they have a positive impact on accuracy, speed and reduction of costs. The study by Ziegenfuss [285], titled BSC, aimed to improve performance of an internal control department, using BSC and benchmarking. It is considered the first attempt to do so by using the BSC methodology, developed by Kaplan and Norton to measure the performance of an internal audit department. This BSC describes the professional standards and provides guidelines for performance measurement. The main task of the control executive is to create and decide the quality assurance program and implement its functions in accordance with the professional standards. The study assumed that the selection of correct KPI reports could be difficult, and requires a large number of performance measures.

The study considered that the quality assurance program is the fourth element of the internal control system and can elicit answers to two key questions: What are the best procedures? How can procedures be linked to strategy? The development of the internal control BSC was accomplished in several phases:

1. Interpreting the vision through the consensus of stakeholders regarding the vision.
2. Communication and the Correlation: Parties reported their strategy to all job levels in the company and correlate management control with management and individual objectives.
3. Action planning through work integration and financial plans.
4. Feedback and learning, which allows assessment of the strategy in terms of performance.

The study concluded that:

- a. Performance measures should not be conducted on an individual basis.
- b. Performance of the internal audit department must be assessed on the basis of the four perspectives.
- c. Functions and objectives of the internal audit department should be seen as an integrated set of objectives and procedures.
- d. To reduce the gap between the long-term objectives and the individual management procedures, the four operations (interpretation of the vision, communication and correlation, action planning and feedback) should be consistently used.
- e. The main external and internal parties should be involved in the selection of performance measures.

Norreklit [216] set out to analyse the assumptions underlying the BSC. The study emphasized that BSC links the financial and non-financial KPIs, according to the four directions and concepts of performance, through a causal indicator, while focussing on the strategic objectives. This is necessary since it allows non-financial KPIs to forecast future financial performance. The BSC's causal relationship was criticized because there is conflict regarding whether it is causal or logical. The study concluded that the BSC is considered

only as a measurement system, focussing on the financial KPIs for monitoring purposes. It is also not only a strategic measurement system, but also a control system, since it integrates financial and non-financial KPIs, within the framework of strategic control, which are linked in a causal relationship, and are related to all processes in the organization. The study concluded that the relationship is logical, not causal, taking into consideration that there are sub-KPIs affecting future forecasting. In his study, Dittenhofer [286] argued that the objective of internal auditing is to determine whether the auditor's control is valid, effective and conducive to achieving company goals. Also, the study emphasises the importance of ensuring the security of financial and operational controls (performance), and the credibility and reliability of financial statements and operations (performance) reports. Dittenhofer examined a number of other issues including adherence to laws, regulations, policies, procedures and agreements, contracts and other financial instruments and good practice, together with adherence to ethical and cultural norms; the study also assesses the performance of executive, middle and upper management in terms of the preventive measures taken to secure the physical, intellectual, and cultural assets of the organization. The study recommended that the top management of an organization should closely monitor all activities and process, and should continuously support internal control departments by providing professional development opportunities for staff to help them develop their control potentials.

Nicolaou [189] conducted a study using a sample of 600 US companies. The conditional variables used to measure AIS integration indicate the degree to which the system is aligned with the structure of the organization; the reliability of information exchanged between various departments, and the effectiveness of electronic communication of information within the organization network. The system's effectiveness was measured in terms of the way that decision-makers used the information elicited through the system. In addition to the information resulting from the various operations of the system, management reporting systems, budgets and the need to control processes were also examined. The study concluded that a strong, positive relationship between the AIS design and the conditional variables provides a more robust and successful system. The effectiveness of the system is measured by the degree of satisfaction experienced by the decision-makers, and accuracy in monitoring the system's output of information, and verification of information quality. The study focused on two major variables: the flow of information within the organization, which includes the flow of AIS information, (with the understanding that AIS effectiveness depends on the quality of the information system); and the decision-makers' realization and

acceptance of the importance of information resulting from the accounting system. The study of Malina and Frank [287] was designed to test the effectiveness of the BSC in achieving the strategic goals of improved communication and control. Results revealed that managers of the target industrial companies were strongly aware of the importance of the relationship between the BSC and the improved profitability of a company. Dennis et al. [288] conducted empirical studies that identified the ways in which a company can use BSC to assess its operational strategy and identify any potential problems, and then develop plans to reduce the severity of these problems. The study was based on the hypotheses of Kaplan and Norton 1992, where strategy was defined as a set of hypotheses that linked financial and non-financial measures with the future values, through a series of relationships between causes and effects. The study used data from retail stores. The study concluded that core competencies should be reflected in whatever strategy is adopted, and that it is important to establish performance measurement systems that can be used to monitor, analyse and control a business organization's strategy.

The study by Melville [289] was intended to analyse the role of internal auditing in the management of company strategy, particularly in assessing the performance of the internal audit department, in accordance with the BSC model. The study sample comprised 178 internal auditors, representing a wide range of different nationalities and all sectors of the economy. A questionnaire was distributed that was intended to collect the internal auditors' views concerning their individual and their company's attitudes to using the BSC model as a means of assessing the performance of a company's internal control department and its relationship with the general strategy of the organization. An analysis of the study results indicated that the respondents agreed on the importance of using the BSC model to assess the performance of internal control departments, and the significance of that model's role in the success of a company's control activities in general. Andries and Rousseau [290] proposed and developed a strategy to strengthen the role and internal control function of South African companies, using BSC as a guideline. The study concluded by recommending a sophisticated strategy based on a systematic method based on the concepts derived from the latest literature in this field and that took into consideration the relationship between the KPIs. The study also concluded that the BSC is a framework that emphasizes the strategic role of the internal control function, and produces maximum efficiency and effectiveness in an organization's performance. Also, the BSC ensures the validity and viability of data resulting from the internal auditor, and creates a powerful tool for the flow of information to senior management. It also concluded that internal control can ensure effectiveness and efficiency



by aligning a company's KPIs of strategic performance with the decisions of senior management, based on accurate company information. The researcher admitted that support for the role of an internal auditor has not been addressed and that there is an opportunity to support the internal auditor's role by means of effectively applying the BSC, in the internal control department of a business organization.

Mustafa [291] analysed the procedures used by audit firms in Saudi Arabia in order to examine the impact of financial and non-financial information on the scope of control. The study revealed that auditors, to a large extent, focus mainly on financial information during the auditing process, using non-financial information only as a secondary tool. The study also revealed that the scope of the auditing process is expanded when the financial and non-financial information give unfavourable indications. Krishnan et al. [292] conducted an analytic study to assess the quality of data produced by AIS. The study revealed that assessors of data quality need specific information to help them to ascertain whether the monitoring model is feasible. However, with this approach, assessors are relying on personal and therefore subjective judgement, rather than on the monitoring procedures identified by the model. It neglected to take into account the role of standards that must be adopted through the model; by allowing personal judgements to be made, this approach weakens the validity of the assessment. Grembergen and Haes [293] developed a generic IT governance BSC concept for the IT functions and its processes as an internal service provider by adopting four different perspectives (corporate, customer, operational excellence, and future). They developed the IT-BSC framework to oversee the IT governance process, monitor its effectiveness, and determine how it can be improved. The result of implementing this framework in organizations is that it can empower their boards, CEOs, CIOs, executive management, business, and IT users by providing them with the necessary information to act and achieve a better partnership between business and IT, therefore producing better results. Furthermore, IT governance BSC can play an important role in an overall program that should be in place to enhance corporate governance. Borisas and Rolandas [294] explore the opportunities available to adapt the BSC framework to measure the effectiveness of internal control, taking into account the relationship between the internal control on the one hand, the and administrative decisions, overall strategic objectives of the company, and the various aspects of internal control. The study confirmed that performance measurement is critical for control activity, and that linking internal control with the vision and objectives of the company's strategy should be taken into consideration. The study provides a systematic framework that addresses practical issues arising from performance measurement, by

focussing on strategic issues and linking the common approach of internal control with the BSC.

Rolandas and Vytautas [295] conducted a unique study that analysed performance measurement in internal control, based on two main factors:

1. Significantly increased attention given to internal control due to the shift to a knowledge-based economy, in addition to the design of an organizational performance measurement system which translates the strategy into multiple procedures.
2. The role of internal auditing in the overall management spectrum that has grown during the last decade, which in the early stages focuses in particular on financial information, monitoring and control operations.

The results of the study revealed that it might be reasonable to integrate the three dimensions (inputs, processes, outputs) of the performance measures, identified by the internal control department. It also revealed that there is a strong relationship between KPIs, which can be used to measure the dimensions, especially for internal control, to reflect the interaction among dimensions, and that they agree with the general concept of BSC, which establishes a link between cause and effect. Results indicated that, despite the wide adoption of BSC, it is not very popular among internal auditors, since KPIs only indicate the extent of compliance with international standards of professional practice. Also, when measuring internal control and monitoring its activities, it is necessary to indicate the value of control, not only from the perspective of review, but from the perspective of the parties concerned. Furthermore, it was concluded that KPIs can be used in conjunction with BSC dimensions, and consistent with the dimensions of internal control activity.

Abaneh [252] implemented the BSC model in the Jordanian Customs Department. The model assessed the Customs Department in terms of four major perspectives (financial, clients' satisfaction, internal processes, growth and education). The financial perspective was measured by analysing income, expenditures, the difference between them and the percentage of Customs Department's revenue compared with the total local revenues according to the Jordanian budget during the period from 1996 to 2005 inclusive. Client satisfaction was measured by means of a questionnaire distributed to 100 customer clearance companies operating at the Customs Department, to measure the satisfaction of companies'

representatives regarding the procedures conducted by this Department, and the services it provides. Another questionnaire was used for a sample of 150 employees in the Customs Department, to measure their satisfaction with the central internal processes, growth and learning. Results revealed that the financial performance was positive for the period of the study. Clearance companies' representatives showed an average satisfaction towards the services and procedures. Customs Department managers showed greater satisfaction with the internal processes than did the non-managers. Nicolaou and Nagpal [32] examined AIS and its infrastructure in terms of the flexibility or complexity that it brought to the work of internal auditors in the USA, in light of the new laws, i.e., Sarbanes - Oxley Act of 2002 and AS 5.5. The study analysed the US literature on the issue, which in fact was inadequate, especially in the analysis of audit and control laws passed by the U.S. government. The study revealed that an AIS with a flexible and extended infrastructure gives flexibility to the internal auditor's work, and ensures compliance with the recently issued U.S. laws. The study recommended the need for more researches and studies on the subject in order to enhance and expand the body of theoretical knowledge. Holper [296] aimed to use the general BSC's framework as an effective tool to link company control strategy with a performance management system. It also aimed to reveal how BSC can be useful in responding to questions from key personnel such as senior management and control committees, on how to manage performance measures, add value to the organization and ensure harmony between the objectives of internal control and the main strategies of the organization. The study emphasized that BSC can help management to focus on improving staff performance, quality assurance activities, and can also be used as a benchmark for the management of internal control and other departments. The study concluded that KPIs-BSC strategies and the core operational activities should be specific to the needs of an organization, in order to be able to identify the best way to manage internal control.

#### **5.4.2 Literature review: The importance of AIS in improving the efficiency of Internal Control Systems in banks**

Geerts and White [297] implemented AIS in e-commerce operations in a number of business sectors. The study pointed out the significance of AIS in the formation of an integrated database that helps to facilitate business operations through the Internet. The study used the comparative analytic method in the AIS applications used by banking organizations, since they are the most common users of information technology in general and AIS in particular, and they spend large sums annually on these techniques. The study concluded that there was

a significant correlation between the evolution of e-commerce and the rise in spending on information technology in general and on AIS in particular, most evident in the banking sector. The study also concluded that a key motive for investment in information technology was to ensure customer satisfaction, retain existing customers, and attract new customers. Davies and Albright [192] explored the effectiveness of the BSC in improving financial performance. They used a quasi-experimental approach to determine whether improvement in financial performance occurred after implementing BSC, and whether this assessment method produces better improvement than a measurement system that uses only. The study was applied on banking organization located in the USA on experimental and control groups. The study provided evidence to support the proposition that the BSC can be used to improve financial performance. The study by Alqatanani [30] explored the current status of internal control systems in the commercial banks in Jordan and assessed the degree of durability and effectiveness of their procedures and controls designed in an AIS computer-based information system environment. The study also aimed to determine the extent of the compatibility of between the AIS control system's properties and the generally accepted control standards and specifications. The study concluded that the characteristics of the AIS control system correspond, to some extent, with control criteria, and acknowledged that the control system had many advantages. However, this study of the banks chosen for the sample showed the existence of a set of malfunctions, weaknesses and shortcomings in the AIS control system, and many shortcomings in a number of control components and tools at the general and application control levels. The study also concluded the existence of a relationship between the compatibility of AIS control system properties, and the conventional controls and some organizational and structural characteristics, from the viewpoint of the banks' managers of computer and information technology, and their external auditors.

Zaman's [202] study identified the number of companies that use the BSC and the number of those intending to apply it within a few years. The researcher measured the extent to which chief executive officers, managers, accountants and financiers were satisfied with the BSC as a measurement system for companies and as a complete and BSC system. A questionnaire was distributed among 125 major companies, 33% of which applied the BSC and were convinced that it is a valuable strategic tool. Khalid [298] aimed to identify some characteristics of the technical and AIS environment by using KPIs (management, convenience, security and safety attributes), and measuring their availability in the Jordanian banks. In addition, the researcher attempted to ascertain the impact of these characteristics on

operational control risks from the perspective of internal control and auditing staff, and the external auditors, in Jordanian banks. Also, the researcher determined the extent to which respondents showed a consensus of opinion in their responses to a questionnaire. The researcher developed a questionnaire based on the theoretical framework and previous studies, and distributed this to 64 respondents chosen as the sample for the study; the sample consisted of employees in the internal control departments of Jordanian banks and their external auditors. Using statistical comparison, the study revealed significant discrepancies between the views of internal control departments' staff of Jordanian banks and the external auditors of these banks, regarding the availability of technical support and AIS for the investigated KPIs. Based on statistical results, there are no discrepancies between the views of the two samples of the study regarding the extent of impact of the technical environment's characteristics of AIS on the KPIs related to the operational risks in the Jordanian banks. Following an analysis of results, the study provided a set of recommendations considered necessary to improve the technical environment of AIS in the Jordanian banks to limit control risks.

### 5.4.3 Literature Conclusion: The importance of AIS in improving the efficiency of Internal Control Systems

The table below is a Conclusion of the literature pertaining to AIS and its role in improving the efficiency of internal control systems.

Table 5.3: Conclusion of studies on the importance of AIS in improving the efficiency of internal control systems.

Researcher	Objective	What has been achieved
Albrecht et al., 1989	Examined ways to assess the performance of internal control departments, in eighteen of the most powerful companies in the U.S.	Although many companies tend to assess internal control departments on the basis of analysing the costs and measurable benefits achieved by such departments, the administration's commitment to internal control, in addition to their

		planned budget planning of the organization, is not an enough objective evidence for the efficiency and success of the interior control department, in carrying the burden of responsibilities, and then cannot be relied upon alone as a measure to assess the performance of the internal control department.
Tayles and Drury, 1994	Identified the possibility of applying modern AIS methods, derived from theoretical studies; identified the progress of this application, determined the most important practical methods for control, assessment of capital spending, identifying cost and measure performance.	Results pointed to a number of issues: the importance of accountants' participation in the planning stages, design, and product development, especially in those companies using advanced manufacturing systems, in order to control and determine the significance of using non-financial measures.
Liberatore and Miller, 1998	Developed a framework to integrate the system of activity-based costing with the BSC system, to achieve strategic logistic support and develop a monitoring process.	These two systems can complement each other to achieve all of the goals or objectives; the overall performance measurement system, according to the BSC, could be used as a tool to monitor the strategic channels.
Rezaee and Reinstiem, 1998	Detected the impact of technological tools and their related systems on the performance of accountants; revealed their impact on the development of work and improved production efficiency to achieve these aims.	Agreed on the need to use the latest technological systems for internal auditing processes, since these have a positive impact in terms of accuracy, speed and reduction of cost.
Ziegenfuss, 2000	Developed the internal control department, using BSC and benchmarking.	1- Performance measures should not be assessed on an individual basis. 2- Performance of the internal audit department must be assessed on the

		<p>basis of the four perspectives.</p> <p>3- Functions and objectives of the internal audit department should be considered as an integrated set of objectives and procedures.</p> <p>4- To reduce the gap between the long-term objectives and the individual management procedures; includes recurrence of the four operations (interpretation of the vision, communication and correlation, action planning and feedback).</p> <p>5- The main external and internal parties should be involved in the selection of performance measures.</p>
Norreklit, 2000	Conducted an analysis of BSC assumptions.	BSC is considered as a measurement system only, focussing on the financial KPIs for monitoring purposes. It is also not only a strategic measurement system, but also a control system, since it integrates financial and non-financial KPIs, within the framework of strategic control, which are linked in a causal relationship, related to all of the work phases in the organization.
Dittenhofer, 2004	Identified the basic objective of internal auditing.	The objective of internal auditing is to determine whether auditor's control is valid, effective and conducive to the achievement of goals. Also, it emphasizes and ensures the security of financial control and operational control (performance). Furthermore, the financial statements and operations (performance) reports are credible and reliable. Also, any audit must comply with laws, regulations,

		policies, procedures and agreements, contracts and other financial instruments and good practice.
Nicolaou, 2000	Advanced a contingency model that examines sources of requirements for organizational coordination and control as they affect the extent of integration in an AIS.	By taking into account the relationship between the AIS design and the conditional variables, this offers a more robust and successful system.
Malina and Frank, 2001	Tested the effectiveness of the BSC in achieving the strategy of communication and control.	Researchers identified a level of awareness among managers of the target industrial companies regarding the importance of the relationship between the BSC and the increased efficiency and profitability of the company.
Dennis et al., 2002	Investigated how a company can use BSC to assess its operational strategy and identify the potential problems of its strategy and then develop plans to minimize the severity of these problems.	Showed the significance of implementing a strategy that is consistent with the requisite core competencies; revealed the importance of building performance measurement systems that can be used to monitor, analyse and control a company's strategy.
Melville, 2003	Analysed the role of internal audit in the management of a company's strategy, particularly in assessing the performance of the internal audit department, in accordance with the balanced assessment model of the strategic performance.	Sample respondents agreed on the significance of using the BSC mode, in performance assessment of internal control departments, and the significance of that model's role in the success of the company's control activities in general.
Andries and Rousseau, 2004	Proposed and developed a strategy to strengthen the role and internal control function of South African companies, by including a BSC record as a guide.	BSC is a framework that emphasizes the strategic role of the internal control function, and achieves a maximum extent of efficiency and effectiveness in an organization's performance; BSC ensures the validity and viability of data resulting from the internal



		audit, and creates a powerful tool facilitating the flow of information to senior management; internal control can emphasize the effectiveness and efficiency by aligning the company's KPIs of strategic performance with the decisions of senior management, based on accurate company information.
Mustafa, 2004	Examined the impact of financial and non-financial information on determining the scope of control upon performing the analytical procedures at the audit firms in Saudi Arabia.	Auditors, to a large extent, focus with great attention on financial information in determining the scope of auditing. Meanwhile, non-financial information is used as a secondary tool in the auditing process; the scope of the auditing process is expanded when the financial and non-financial information yields undesirable indications.
Krishnan et al., 2005	Conducted an analytic study to assess the quality of data in AIS.	Assessors of data quality need specific information, to help them understand whether the monitoring model is feasible?
Grembergen and Haes, 2005	Oversaw the IT governance process to determine its effectiveness and ways in which it could be improved.	IT governance BSC organizations can empower their board, CEO, CIO, executive management, business, and AIS participants by providing them with the information that is needed to act and achieve a better combination between business and IT, thereby producing better results; AIS governance BSC can play an important role in an overall program that should be in place to enhance corporate governance.

Borisas and Rolandas, 2006	Investigated the opportunities available to adapt the IT-BSC framework to measure internal control, taking into account the relationship between internal control one the one hand, and administrative decisions, and overall strategic objectives of the company, as well as on the various aspects of internal control.	Performance measurement is critical for control activity, and that linking internal control with the vision and objectives of the company's strategy should be taken into consideration.
Rolandas and Vytautas, 2007	<p>Conducted an analysis of performance measurement in internal control, based on two main factors:</p> <p>1- Large increase in the attention given to internal control to shift to a knowledge-based economy, in addition to the design of organizational performance measurement system which translates the strategy into multiple procedures.</p> <p>2- The role of internal auditing in the overall management spectrum that has grown the last decade, which focuses in particular in the early stages of financial information, monitoring and control operations.</p>	Despite the wide adoption of BSC, it is not very popular among internal auditors, since KPIs only indicate the extent of compliance with the international standards of professional practice; measuring the profession of internal control and monitoring its activities, require pointing out the value of control, not only from the perspective of review, but from the perspective of the concerned parties; KPIs can be used, but with adapting BSC dimensions, in accordance with the dimensions of internal control activity.
Abaneh, 2008	Utilized the BSC model in the Jordanian Customs Department.	The financial performance was positive for the period of the study. Clearance companies' representatives showed an average satisfaction towards the services and procedures. Customs Department staff showed higher satisfaction towards the internal processes than did the non-managers.

Nagpal, 2008	Examined AIS and its infrastructure in terms of the flexibility or complexity of internal auditors' work in United States of America, in light of the new laws, i.e., Sarbanes - Oxley Act of 2002 and (AS 5.5).	AIS with flexible and wide infrastructure gives flexibility to the internal auditor's work, as it provides a standard of quality required by recently established U.S. laws.
Michael, 2008	Used BSC's general framework as an effective tool to link control strategy with performance management system in the company; investigated the usefulness of BSC in responding to questions from key personnel, such as senior management and control committee, on how to manage performance measures, add value to the organization and align the objectives of internal control with the main strategies of the organization.	Strategies and the core operational activities that utilize KPIs-BSC, should be specific to the needs, in order to able to identify the available opportunities to manage internal control.
Geerts and White, 2004	Applied AIS in e-commerce operations in a number of business sectors.	There was a significant correlation between the evolution of e-commerce and the rise in spending on information technology in general and on AIS in particular, more so in the banking sector; achieving the satisfaction and maintenance of customers and attracting new ones, is a key motive for investment in information technology.
Davies and Albright, 2004	Investigated the effectiveness of the BSC in improving financial performance, seeking to determine whether an improvement in financial performance occurred after implementing BSC and if the change in financial performance is significantly greater than a	Provided evidence to support the proposition that the BSC can be used to improve financial performance.

	performance measurement system.	
Alqatanani, 2007	Explored the current status of internal control systems in the commercial banks in Jordan and assessed the degree of durability and effectiveness of their procedures and controls designed in AIS in a computer-based information system environment; they determined the extent to which AIS control systems were compatible with the generally accepted control standards and specifications.	Showed the characteristics of the control system of AIS that correspond, to a medium extent to control criteria, bearing in mind the existence of many strength aspects in the control system on the one hand; but also showed the existence of a set of malfunctions, weaknesses and shortcomings in the AIS control systems studied in sample banks; they emphasized the great weakness and shortcomings of many of their control components and tools in general and in terms of application control; the existence of a relationship between the compatibility of AIS control system properties, with the conventional controls and some organizational and structural characteristics from the viewpoint of banks' computer operators, information technology managers and their external auditors.
Zaman, 2005	Identified the number of companies that use BSC and the number of those intending to apply it within few years.	33% of target companies applied the BSC and were convinced that it is a valuable and strategic tool.
Alqatanani K., 2007	Identified some characteristics of the technical environment and AIS through KPIs of (management, convenience, security and safety attributes), and measure their availability at the Jordanian banks; identified the impact of these characteristics on risks of operational control in the Jordanian banks, from the viewpoint of internal control and auditing staff of	Revealed significant discrepancies by means of statistical indications between the views of internal control departments' staff of the Jordanian banks and the external auditors of these banks regarding the availability of the technical environments' characteristics and AIS for the investigated KPIs; there are statistically significant discrepancies between the views of

	Jordanian banks and their external auditors; identified the extent of respondents' consensus in answering the questions of the study.	the two samples of the study regarding the extent of impact of the technical environment's characteristics of AIS for the investigated KPIs in the operational risks in the Jordanian banks.
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In the next section, the researcher discusses about conclusions drawn from the foregoing discussion of previous studies.

## **5.5 Critical evaluation of the existing approaches to improving the performance of AIS in banks**

The critical evaluation of the existing approaches to improving the performance of AIS in banks suggests that studies addressing AIS in accounting management fields have taken many factors into account including: the characteristics of AIS in the business organizations, the accounting management methods used within these organizations, the relationship between auditing management systems and BSC applications, and the impact of this relationship on business organization's overall performance. Studies also discussed the impact of other KPI variables and their effect on improving the AIS performance in the business organization. The previous discussion leads to the conclusions presented below.

### **5.5.1 AIS Outcomes in measurement performance assessment**

Although AIS emerged in management accounting systems in the mid-seventies, no specific, ideal accounting system was created that could be applied in all business organizations or even within the same business organization to address all possible situations and circumstances. This is because many of the management accounting issues are related to several diverse KPIs conditions and variables. Scholars in the previous studies disagreed on specifying the most effective KPI types, their number and the relative significance of these variables when using AIS. This is because they have not reached a consensus of opinion regarding effective KPIs because their studies have been diverse in terms of their objectives, specific field of investigation, and their applications and approaches. The failure of AIS outcomes to meet performance measurement requirements and performance assessment,

especially in modern business environments, which are characterized by rapid and ongoing development, shows that there is a need for significant development in the areas of strategic planning, competence and availability of information to serve stakeholders' interests, satisfy customers and auditors in both the long and short terms, and ascertain the reasons behind the results. There is a gap between the theory and the practical application of AIS, as seen in the variety of results and differences produced by modern AIS in practice. AIS systems must be modified in order to achieve consistency and overcome criticisms and perceived shortcomings so that they can maximize any business organization's efficiency regardless of the type of industry or location. This change has to be founded on the basis of a thorough and accurate understanding of the purpose and importance of AIS, by the developers and the executors. Through the successive improvements of the AIS application, the role of the management accountant should change from "performance assessment" to "performance management". This requires re-definition of the management accountant's role to include the activities and behaviors related to "performance management". Also, changing the role of management accountants is highly important if they are to successfully face job challenges and keep up to date with the developments of IT; they need to actively participate in the development of IT, rather than just being the end-users.

### **5.5.2 Modern trends used to measure and assess performance in the contemporary business environment**

Developments in the contemporary business environment have changed managers' concepts of and approaches to their organizations' future performance. Therefore, a performance measurement system that is based solely on financial profit is not considered as a suitable means of achieving a business organization's strategic goals. Rather, it is necessary to use an integrated framework of performance measurements to reflect a business organization's performance in all dimensions and from multiple perspectives, in order to meet internal and external requirements and expectations. The current KPI approach has many shortcomings, including: its historical character, its inability to reflect a business organization's competitive value, its inability to provide relevant information regarding those important issues that affect a business organization's success, and its focus on short-term performance assessment.

It is essential that KPI measurement tools be improved so that the focus is not only on the financial aspects of a business organization, but also on the non-financial aspects, using a

comprehensive framework that takes into account all of the organization's activities. Also, such tools can indicate the extent to which strategic goals and competence can be achieved and can overcome the challenges and limitations of financial-only measurements. Researchers attempted to resolve this issue by proposing new methods, realizing the importance of integrating both financial and non-financial aspects in order to improve performance and achieve the strategic goals. All of the previous studies agreed on the importance of using the modern management accounting systems to assist management, planning, monitoring and decision-making in order to keep pace with the rapid changes in the surrounding environment. Some studies focused on identifying the practices of performance assessment, based on different viewpoints in the business organizations, in an attempt to reveal the weaknesses in their assessment process in order to arrive at appropriate solutions. Despite the significance of the previous study in management accounting, the researcher generalized the results based on other situations, besides adopting the traditional methods of inferring the KPIs' influence mentioned in the studies. It is noticed that most of those studies did not use rational or mathematical methods to determine overlapping and relationships between KPIs on one side, and BSC perspectives on the other, then relate them in order to achieve the required goals.

### **5.5.3 The philosophy of adopting the BSC performance module in the contemporary business organizations**

After reviewing the previous studies, it is obvious that the traditional financial performance measurements are most inadequate since they are generally based on historical data, and/or they focus on financial results only and measure internal performance only in the short term. Most of these studies agreed on the necessity of using other KPIs to support the traditional financial performance measurements represented in non-financial performance KPIs, which measure the external performance in the long term and focus on performance causes and motives. Also, they concur that these KPIs must include all management levels in the organization and cover both the financial and non-financial aspects of the business organization.

Performance measurement is considered a major element in the contemporary business environment and one that is essential for the success of organizations. Also, the integration of financial and non-financial KPIs in terms of performance has become the basis for modern management accounting practices and accounting studies; by measuring and assessing performance, it provides a balanced performance measurement.

The balanced performance measurement is considered to be integral to management philosophy as it can help to achieve the strategic goals of business organizations by assessing their financial, operational and strategic performance according to an integrated financial and non-financial KPIs framework, in a balanced manner that provides integrated information to its users. Consequently, the following is concluded:

1. All of the previous studies of BSC recommended the use of the balanced performance measurement in the performance evaluation process as an essential strategic management tool to develop the KPIs financial and non-financial performance for the purpose of improving the competitiveness of an organization.
2. The implementation of BSC requires several important steps, the most important of which is a comprehensive and accurate interpretation of the vision and strategy of senior management personnel.
3. Also, the KPIs-BSC using the BSC can ensure that objective decisions can be made in relation to projects and future investments, which in turn impacts positively on performance in general. Consequently, the use of non-financial KPIs leads can increase a business organization's profit.
4. The BSC is an essential means by which to establish strategic communications and management control. However, its application and implementation can face many challenges. If the BSC is to produce the anticipated strategic communication and management control outcomes, then these challenges need to be acknowledged and overcome.
5. It is important to know and understand the tasks that must be accomplished in order to build a fully-developed and modern information system which can provide, analyze and exchange information within a business organization; moreover, such a system should enable a business organization to detect the needs of current and potential customers and deliver the appropriate level of service quality. The BSC provides the means of improving customer relations, thereby improving a business organization's prospects of prevailing over the competition.
6. Many of the researches and studies focused on testing various hypotheses related to the KPIs-BSC, and concluded that it is important to apply balanced performance measurements and strategic control. However, it must be noted that the relationship between the KPIs-BSC measurements is rational, not causal.



7. The use of BSC ensures that any administrative decisions regarding future projects and goals will be objective, which in turn will have a positive impact on performance in general and will meet stakeholders' expectations. Consequently, the use of non-financial-based KPIs will increase a business organization's profit.

## **5.6 Shortcomings identified in existing literature regarding performance improvement of AIS in Jordanian banks**

After, reviewing the previous literature and examining AIS problems in banks in Jordan, it became obvious that AIS faces some pressures and some internal and external challenges. Therefore, the effectiveness of these systems in achieving their objectives to provide timely relevant and reliable accounting information for the purposes of competition, planning, control, monitoring, performance assessment, decision-making, and mapping strategies, etc., is negatively or positively affected by a set of internal and external KPIs. For example, in order to fulfil their role to the fullest, those systems must take into account the legislation, laws and market conditions and competition, as well as the organizational structure and individuals' behavioural relationships, and banks' capabilities in Jordan in terms of hardware, software, network systems, data protection... etc.

Previous studies revealed the presence of diverse and complex KPIs emerging from the above-mentioned and other factors affecting AIS performance effectiveness in banks in Jordan [276, 299-301]. Those studies did not focus on the extent or scope or degree of that impact on the commercial banking environment in Jordan in particular. Therefore, banks in Jordan should seek all means and methods available that ensure a comprehensive implementation of performance assessment systems that include AIS, despite the variety of KPIs or their impact. This is to ensure the smooth operation of AIS, and reflect the real environment and the available means to ensure the successful implementation of bank strategies. Moreover, those banks should stop using traditional systems of performance assessment in the normal sense, which focus solely on assessing and measuring performance; rather, they should also focus on improving the performance of the AIS which is the backbone of business organizations and the processor of all of its operations. Finally, there is a recognized need to adopt a new philosophy in order to improve AIS performance in commercial banks in Jordan, by

adopting clear and comprehensive strategies that connect financial and non-financial KPIs. It is also important to create special strategies for the AIS-KPIs environment, especially in the commercial banks in Jordan, in order to support the capacity of AIS to face competition. Moreover, it will fulfill all stakeholders' information requirements needed to measure performance, facilitate decision making, and control operations.

## **5.7 Conclusion**

This chapter reviewed various literatures related to this study and included: The KPIs that affect AIS performance and all other related systems in various business organizations; strategies used to develop AIS in various systems' surrounding environments and circumstances; and various tools and methods used by researchers to improve the performance of various information systems. Generally, the researcher argues that the previous literature discussed the issue of improving AIS performance in with the context of a particular environment using methods that were appropriate for the type of work engaged in by the organization, and its circumstances. The major shortcoming of these studies is that they discussed the issue of improvement in terms of one or more KPIs, but did not consider all financial and non-financial KPIs. Furthermore, most studies did not have clear strategies to improve AIS, especially those related to linking the general strategies of the business organization, and did not acknowledge their significance. Also, most studies emphasized the theoretical aspects when analyzing the relationships and impacts of KPIs, and ignored the practical aspects. The researcher concluded that, to date, no ideal method has been developed whereby AIS performance can be improved and applied to all business organizations regardless of environments, nature of the work, management policies and available capacities. Therefore, this study attempts to utilize, where possible, the results of several previous studies. It will also address the shortcomings of the previous studies by discussing the KPIs that affect AIS performance in Jordan's commercial banking environment. This study will also define the most effective and specialized KPIs, adopting a methodology that covers all financial and non-financial KPIs, and determining the goals and strategies that enable this study to achieve its objectives successfully.

The next chapter will discuss the problem of the study, and requires an in-depth approach in order to examine all aspects of the commercial banks in Jordan. It will review all KPIs that affect AIS performance in those banks, and point out the significance of this study compared with the previous studies discussed in this chapter.

# Chapter 6 -

## Problem Definition

### 6.1 Introduction

In the previous chapter, a review was conducted of the literature pertinent to the subject of this study and its related issues. In this chapter, the problem definition, the related issues, and the solution are discussed. The structure of this chapter is as follows. In Section 6.2, a basic KPI classification affecting AIS performance in commercial banks in Jordan is presented. Section 6.3 presents a discussion of the impact of KPIs on AIS performance in banks. In Section 6.4, the problem to be addressed in the study is specified. In Section 6.5, the significance and uniqueness of this study is discussed and Section 6.6 is a Conclusion of the chapter.

### 6.2 Basic KPI classification affecting AIS performance in commercial banks in Jordan

By reviewing the problems that surfaced in previous studies, this study identified the most significant KPIs generally affecting the effectiveness of AIS performance in banks in Jordan. Those KPIs can be classified as: the environmental KPIs surrounding the bank (environmental KPIs), the bank's regulatory practices (organizational KPIs), the behavioural KPIs, and technological KPIs [276]. This classification is used only to facilitate the process of tracking (not limiting) KPIs, and identify each and every one of the KPIs affecting the efficiency of such systems. Thus, they will be better understood and in turn this will produce a better understanding of the problems faced by AISs. This process involves tracking the environmental factors surrounding the events and operations of commercial banks in Jordan related to the application of KPIs-AIS, whether economic, cultural, social, legal, or political. Also, it enables the tracking of KPIs-AIS performance in terms of efficiency and effectiveness, and reveals any other relevant KPIs problems associated with AIS application in banks [302]. These include behavioural factors, users, customers, interest in computer

technological developments, computer applications, networks, internet, database systems and e risks associated with monitoring information technology [303]. This will be discussed in the next sub-sections as shown in Figure 6.1.

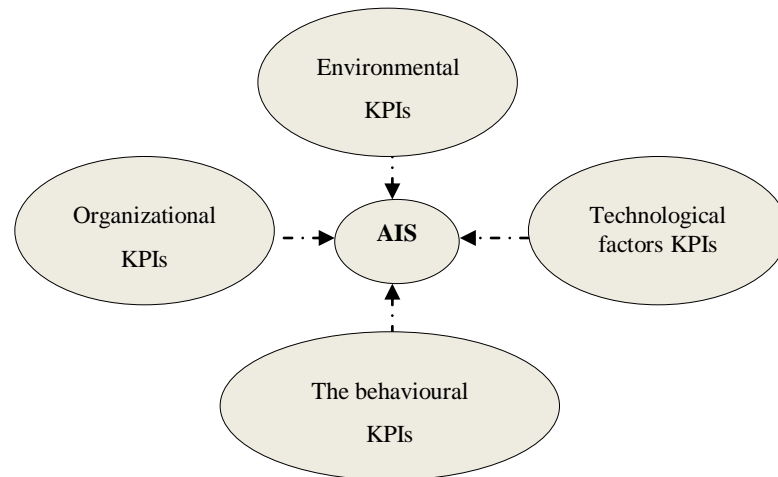


Figure 6.1: Basic classification of KPIs affecting the performance of AIS in the commercial banks in Jordan

### 6.2.1 Environmental KPIs of banks

As in all other business organizations, banks in Jordan are affected by their surrounding environment (Figure 6.2), since the effect is mutual between these banks and the surrounding elements, where everything within these limits is under bank control [298]. This is unlike external influences which are currently increasing due to changing economic, social, political, legal and technical conditions in Jordan, in addition to the impact of the global crisis of 2008/2009, which affected banks directly and/or indirectly. These external factors proved the ineffectiveness of some of the laws, policies and procedures previously established for achieving a disciplined work environment [276]. Moreover, the laws were often ignored and in many cases this led to corruption or fraud as demonstrated by the Bernard L. Madoff case, which led to the restructuring of banks and companies' control systems and practices[304-306]. Bank management should keep abreast of all legislative and other changes and adapt its operations accordingly. In order to do so, they must have access to a great deal of accurate, comprehensive information. This environmental impact has

multiple KPIs that can be addressed according to their impact on AIS performance in the commercial banks in Jordan, as illustrated below (Figure 6.2).

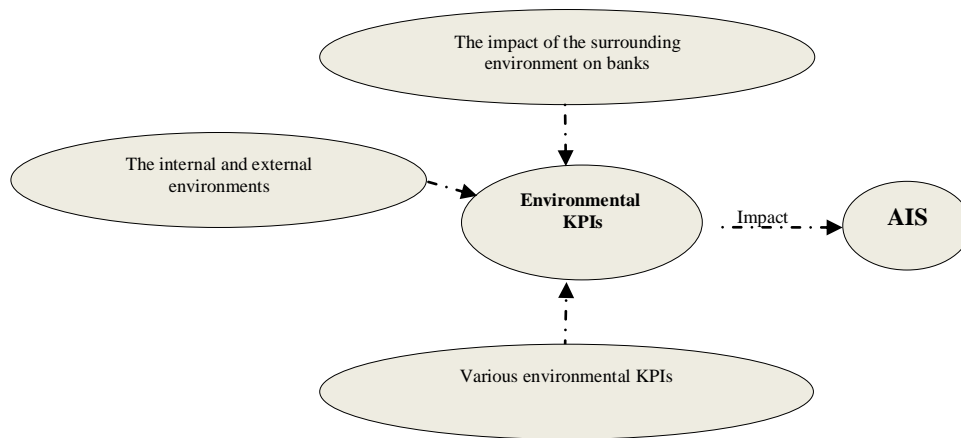


Figure 6.2: Environmental KPIs

### 6.2.1.1 The impact of the surrounding environment on banks

Results of studies' analyses of banks' surrounding environment in Jordan in the previous literature revealed that these banks are significantly affected by KPIs, which also the efficiency and effectiveness of the AIS. Results also affects revealed that the degree of impact differs according to the level of interest shown by the bank department responsible for the KPIs in the building, design and development of the AIS [298, 303]. Having efficient and effective AISs at banks in Jordan is contingent on a range of KPIs related to each bank's environment. The study by Kaddumi [307], revealed that 90% of the study sample considers that one of the banks' most significant problems is the lack of widespread points of sale. In addition to the lack of awareness among bank customers of the concept of electronic banking, in terms of risk, banks seem to focus only on the existing laws; however, there is a lack of clear legislation intended to protect electronic banking transactions, especially in relation to AIS. The AIS in Jordanian banks is an open system that interacts with the surrounding environment. It also derives its key inputs for continuity and job performance, and its outcomes also affect its environment [30, 47]. Al-Dahrawi [68] argues that the KPIs that affect the activity of banks, also affect the activity of AIS, especially the information submitted to outside parties. Therefore, the outputs of AIS are affected by the surrounding environment [307]. Al-Dahrawi [68] defined a system's environment as all the elements and factors that affect KPIs in the system which are not subject to control or monitoring. This includes government requirements and consumers and competitors, since they affect the system's performance in some way, depending on the

degree of control. Its impact of one KPI differs from that of another, since customer requirements can be controlled better than government's requirements or competitors' conditions.

The researcher argues that an AIS reacts with the surrounding environment of KPIs, which is an open system that interacts with it, and relies on it, influenced by external conditions and which influences them, but it cannot control them or the AIS designers and analysts. It is important to carefully study and analyse the external environment, since effective AIS performance depends on the quantity and type of KPIs provided by the surrounding environment. In reviewing previous research, it is evident that this issue has not been thoroughly investigated in the context of the commercial banks' environment in Jordan. This might be due to the nature of the commercial activities carried out by banks and which are affected by the surrounding environment of political and economic systems, technology, competition, customers, regulations, laws, and accounting standards. Therefore, it is necessary for banks to design an AIS that provides, in quantity and type, the information required by decision-makers about the surrounding environment, and contributes to reducing the impact of negative external factors [276, 308]. Al Akra[308] argues that in order for the AIS to achieve its objectives and thus achieve the overall objectives of the organization, it has to interact with the surrounding environment, since the information system is an open system that affects and is affected (receives data and provides information). If it is isolated from the environment, it will collapse and fail, since it is an open system that exchanges inputs and outputs with many sub-systems and activities within the organization, and is influenced by the organization environmental developments. Therefore, KPIs must be evaluated and modified according to changes in the surrounding environment in order for them to be appropriate for the AIS function in this environment. Therefore, the researcher believes that a successful and effective AIS is the one that adapts to changes and developments in the surrounding environment. Many AISs in Jordanian banks fail "in most cases" to perform their intended tasks because they fail to respond in a timely fashion to the variables in the system's surrounding environment, which then impacts on the organization's achievement of its objectives.

#### **6.2.1.2 The internal and external environments**

The AISs in banks in Jordan are affected by the internal environment which includes rules and procedures enforced by the central bank of Jordan and the Association of Banks of Jordan [69]. Even the laws and the internal regulations specified separately for each bank

(the Central Bank Law No. 23 of 1971, and amendments), are also affected by the external environment such as market situation, competition, quality of products or services provided to clients, customers' inclinations and need for those products and services, and changes in those needs [36]. The significance of the internal environment emerges through the internal reports, which are based on a number of questions such as:

1. What information needs to be provided?
2. To whom is it to be provided?
3. How should such information be presented?
4. When is the information to be provided (daily, monthly, annually, else)?

With these and other questions, system designers and analysts note the substance of the information required to analyse and design system function. Abdullah and Qatanani [298] argue that the external environment exists outside the information system limits, which means that this environment may be available within the bank, and may extend to outside. The environmental KPIs, located within the bank are reflected in the operational activities. The bank's external environment comprises its operational needs of resources, related market information, competition and technological developments. Therefore, the information systems act to provide the external parties' needs (external beneficiaries) with the information required for various operational activities.

In the previous literature, the researcher noted that banks' management personnel are not seriously concerned with analysing the KPIs of internal and external environments in order to determine their impact on AIS performance. The researcher argues that it is necessary to discuss the impact of KPIs of internal and external environments at the commercial banks in Jordan, since a thorough analysis of KPIs would positively impact on AIS performance, which would decrease the risks associated with decision making. Such analysis would also have a positive impact on the degree of competition with other banks. The significance of internal environment analysis is that it provides a basis for making appropriate choices in the decision-making process, since such analysis would contribute to establishing the bank's current AIS capacities and its future possibilities in relation to its competitive position in comparison with other banks in the same sector.

### **6.2.1.3 Various environmental KPIs**

Al Akra [308] pointed out that there is a group of KPIs in the external environment of the information system associated with customers' needs, bank stakeholders, staff and their associations and bars, lenders, government bodies and other parties. They also stated that there are three environmental KPI factors that affect the information systems including AIS: economic, political and social. They also emphasized that political trends, active social forces, social values, cultural situations, and public and private legislations prevail in each country. All of these factors and facts do negatively or positively affect bank potentials of manpower in KPIs-AIS, and therefore inevitably impact on the effectiveness of such systems' performance. Hajar [36] pointed out that the system has to be consistent and balanced if it is to meet the requirements of various concerned parties. Although the surrounding environment cannot be consistent in a climate of continuous development and change, one of the components of AIS is the human factor which enables it to predict future results, and guarantees the consistency and stability of the system. Romney and Steinbart [37], and Khameis and Na'eseh [309], argue that accountants nowadays, in alignment with the AIS, operate in a stimulating, complex and ever-changing environment. The economic and legal environment in which they work is unpredictable and changing at an unprecedented rate. Therefore, organizations have to change their management structure in order to competently adapt to the ever-altering environments. The researcher argues that the immense development of commercial banks in Jordan in terms of volume, diversity of their activities, and multiple objectives, necessitates the development of KPIs-AIS in response to their noticeably poor performance. Since banks are a part of this dynamic environment, in order to survive and retain their competitiveness and meet their objectives, they need to continuously adapt to new developments. Previous studies have recommended that relevant legislation be passed in Jordan that provides specific laws and guidelines to banks, especially in regards to bank functions and AIS performance.

### **6.2.2 Regulatory practices: Organizational KPIs of banks**

Undoubtedly, organizational KPIs have several benefits since it can distribute work and activities in a practical method, eliminate duality in specialties, define relationships between the staff, and coordinate their work in a clear method. Requirements of information depend on the type of bank, the volume of business, and the management level, since such requirements differ from one level to another, based on the organizational structure and



clarity of authorities and responsibilities [310]. The organizational KPIs are illustrated in Figure 6.3 below:

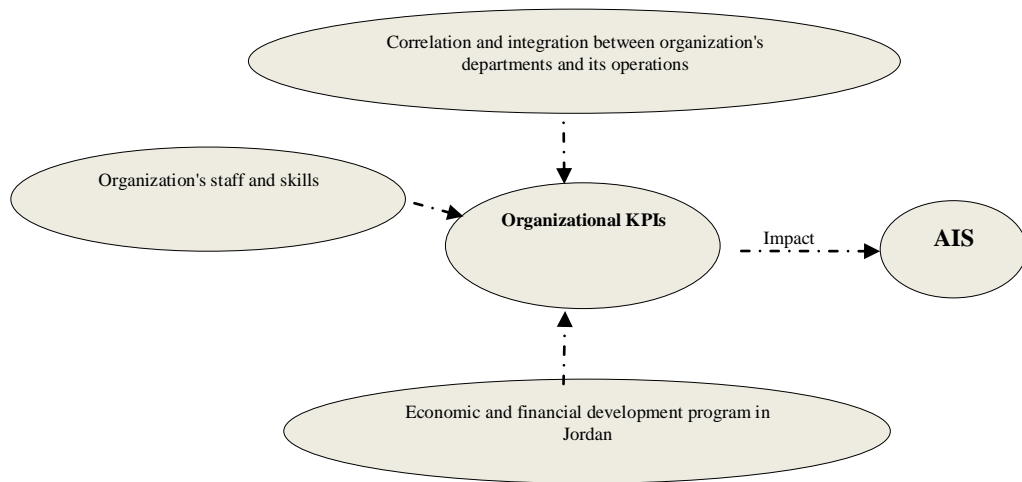


Figure 6.3: Organizational KPIs

### 6.2.2.1 Correlation and integration between organization's departments and its operations

The realization of correlation and integration between the departments of an organization and its operations, always require the flow of data and information between different departments in obvious communication channels. That is what the system designer takes responsibility for, knowing the needs of various departments and determining the channels of communication, through a comprehensive overview of the whole organizational structure. Accordingly, the performance of KPIs-AIS should be correlated and integrated with the organizational structure in order to achieve the flow of reports and data between organizations' sections and departments, to provide the relevant personnel with the appropriate data and information in a timely and accurate manner. The integration of the accounting system and its effectiveness will only be achieved if it is built by taking into account the integration and correlation of the organization's operations and its divisions, to provide a proper flow of data in a timely manner and at the lowest cost [311].

### 6.2.2.2 Organization's staff and skills

The effective and successful performance of AIS mainly relies on having staff with a certain degree of scientific and practical knowledge, adequate for the requirements of the system and capable of achieving system objectives. A system without qualified staff to run it

will be ineffective regardless of the accuracy of its design. It has been noted that commercial banks in Jordan do not focus on training the existing staff or recruiting new staff with the appropriate expertise [312]. However, in terms of ensuring the continuous development of staff skills in the fields described below, KPIs are inadequate [312].

**KPIs of accounting skills:** A previous study stated that accounting personnel appear to lack skills in all aspects of accounting, particularly when it comes to technological or scientific developments that are relevant and applicable to accounting practice in the modern business environment. Also, they tend to be unaware of the best way to elicit and conduct an analysis of various data that is required by internal or external bank staff and/or stakeholders. Furthermore, they lack the skills to prepare and distribute reports and financial statements in a timely fashion that benefits the users.

**KPIs of computer skills for system staff:** There is no doubt that computer usage is spreading to the AIS area in banks, which often deal with a large amount of data. It has become necessary for bank staff to have an appropriate knowledge of and ability to use computer equipment, computer operations, programs, applications and new technologies associated with them. It has been noted that there is a lack of qualified teams with the appropriate academic qualifications and practical experience to deal with computer systems and the various related activities.

**KPIs of management skills for system staff:** It has become apparent that bank management must recognize what AIS can offer in terms of accurate data and information that can assist them to make better informed and timely decisions. Also, staffs need to develop their administrative skills by becoming familiar with all the developments in business management, to recognise their information needs, and to acknowledge and address any lack of expertise [311].

The researcher argues that the success of AIS performance in commercial banks necessitates analyzing KPIs related to staff skills of accounting and management, since the various types and levels of skills determine the quality of their operations, especially in an AIS that requires special skills and high accuracy, as it deals with accounts and figures.

### 6.2.2.3 Economic and financial development programs in Jordan

The implementation of economic and financial development programs in Jordan has resulted in monetary stability, stimulation of the public sector and an increased role in the development process. The recent period witnessed a noticeable improvement in awareness of the need for banking and credit services. This motivated banks to increase their interest in developing their work mechanisms and competence in order to provide more facilities to their clients. Consequently, it became necessary to develop banking legislation to keep pace with these developments, in order to control the supervision and monitoring of banks to guarantee their viability in accordance with the framework of economic and financial policy in Jordan [308]. The researcher argues that any development plan for banks' performance in Jordan should include all KPIs related to systems, especially AIS because of its great significance. This plan should be thoroughly studied together with its strategic phases so that its specific objectives are clear and attainable.

### 6.2.3 The behavioural KPIs

Most studies and researches emphasized behavioural KPIs in AIS performance in the commercial banks in Jordan in relation to producing information. Many accounting concepts and instruments had been reformed in the domain of behavioural sciences, such as the attempts to set standards, prepare planning budgets and study the impact of information on management behaviour in decision-making. Figure 6.4 below shows the behavioural KPIs that need to be considered.

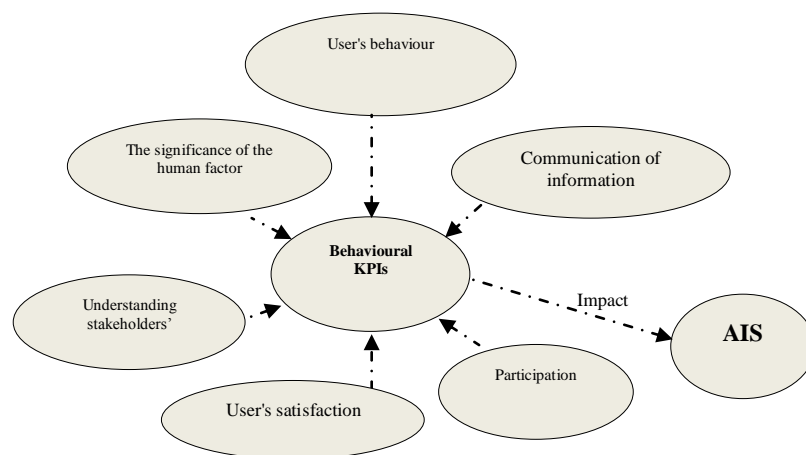


Figure 6.4: The Behavioural KPIs

### **6.2.3.1 User's behaviour**

The concern regarding user behaviour is less to do with intrinsic behaviour and the impact of that behaviour; it has more to do with the way in which information is used. Thus, human behaviour should be comprehended and the factors affecting human behaviours should be studied, in order that in terms of accounting functions, the behaviour of staff and users is directed towards achieving the organization's objectives. The behavioural KPIs should take into account the factors that could affect an individual's behaviour when performing a specific task or making a judgement or decision about a particular issue [313]. The most significant KPIs that have a significant impact on the accounting systems in commercial banks in Jordan include: participation, comprehension, motivation, intentions, group performance rates, etc. Moscov and Semken [59] argue that the information system designer should consider the behavioural KPIs applied to individuals and their work. The issue is not the design of sound and appropriate systems, but the extent to which these are accepted by employees when implemented. The system designer need not necessarily be a psychologist; rather it is enough for a designer to be aware of and familiar with methods of encouraging staff to achieve the objectives of the system. The researcher argues that in order to improve their systems' performance, commercial banks in Jordan should study KPIs related to their staffs' financial and morale requirements, and provide them with suitable incentives.

### **6.2.3.2 The significance of the human factor**

The significance of the human element in determining the effectiveness of the systems was once not of great interest, and the prevailing belief was that staffs are just another tool that can be adapted as needed. This idea proved erroneous, and the trend is now to take a greater interest in the determinants of staff behaviour, since the effectiveness of a system depends on employees because they are the ones who use its outputs, and are pivotal to the success or otherwise of the system. Studying and analysing bank staff behaviour in general and specifically in relation to AIS is one of the most significant factors that should be considered [59]. The researcher argues that the management personnel of commercial banks in Jordan should realize that their staffs are a valuable asset, and should therefore modify their traditional staff management methods. Also, management should realize that their staff are humans with emotions and feelings, and that such emotions and feelings should be taken into consideration when developing systems' outputs. Staff should be provided with whatever is necessary for them to complete tasks well and with satisfaction. This could generate staff loyalty, which will subsequently have a positive impact on their work.

### **6.2.3.3 Understanding stakeholders**

The design and operation of an AIS should take into account the characteristics of information recipients. The accountant's lack of understanding will further obscure the operating capacity of those users and how they will use the information made available to them. Hence, information should be delivered to the user in a way that is compatible with his/her behaviour [314], and facilitate their usage. The accountant might spend much time and effort on preparing and providing information, only to find that it is not appropriate for the end-user's needs. This was revealed by many studies concerning the commercial banks in Jordan. The problem is no longer in how to get the information, but in how to identify the information that is required to meet the needs of the decision-maker [303]. Al-Alami [315] argues that a good AIS is designed in accordance with the needs of its users, and can differentiate between available information and the information required by the decision maker. The information provided needs to be what is expected and required. Rahahleh and Siyam [303] pointed out that the system analyst and system designer should anticipate the accounting data and information that will be required, before designing accounting information systems for commercial banks in Jordan. They also should understand the behavioural concepts that enable the accountant to anticipate the behaviour of bank staff and clients, in order to provide them with the data and accounting information required. Also, they need to prepare and present data appropriately so that information can be readily accessed and understood so that objectives can be achieved. The researcher argues that it is necessary to study KPIs that allow information systems' staff in the commercial banks in Jordan to focus on stakeholders' requirements. Also, they should provide effective KPIs that provide the necessary strategies and tactics to handle stakeholders effectively.

### **6.2.3.4 User's satisfaction**

Yuthas and Eining [17] pointed out that system users' satisfaction is the level at which they are satisfied, which is the measure of conceptual and attitudinal outputs provided for the benefit of decision-makers. Al-Alami [315] pointed out that the output objectives of an AIS can be realized by studying the behavioural impacts of KPIs on those who prepare and use the information to create an intellectual vision of the objectives that an AIS will serve. This is faced by the multiplicity and diversity of information recipients, either directly, such as management, proprietors, clients, creditors, staff and tax bureau, or indirectly, such as governmental parties, chambers of commerce, unions, associations and media. Chin and Lee [316], measured the end user's satisfaction with the information system through his different

expectations and desires towards the system before and after application. Comparing those differences with individuals' assessment for the differences, results in the prevailing satisfaction on desires, the prevailing satisfaction on expectations, which both form the general satisfaction of the user. In conclusion, the issue requires the accountant to realize that his role will be effective as long as he/she realizes the nature of decisions to be taken by a large number of beneficiaries. There is no doubt that the clear distinction of recipients' needs of information leads to the success of the system, which in turn depends on who prepares the information, at one part, and its user (stakeholders) at another, in the following manner that reveals the weakness aspects in this field [30, 298, 302, 317]:

1. The weakness in user's determination for the quality of his needs of information.
2. The weakness of who prepares the information in determining the quantity of information needed by the user.
3. The weakness in KPIs measure in determining the ability of beneficiaries to use information and the capability of who prepares the information to provide them with their needs, and avoid previous mistakes.

In most cases, there is a gap between information producers and its beneficiaries at the commercial banks in Jordan [317], as the gap narrows, the effectiveness of decisions increases together with the effectiveness of the system. Therefore, the researcher argues that AIS might not achieve its expected future objectives, if a different parties' needs (stakeholders) of information were considered, which might conflict. Accounting figures are a reason and a result of the human behaviour, since there is a relationship between the behavioural attributes of accounting information users and the effectiveness of AIS performance at the commercial banks in Jordan. Consequently, realizing the nature of this relationship by systems' designers and who prepares these information or system users, leads to updating this relationship. Also, meets with a meaningful realization by the accountant to know the quality and quantity of information to be delivered to the users. The nature of this relationship should be considered upon preparing and developing the AIS performance at banks.

#### **6.2.3.5 Participation**

The banking top management's autocracy in decision-making impacts on staff and their work, where their views are taken and considered to assist them to solve problems that might arise [303].

The researcher argues that participation, in its simplest sense, is a joint effort to solve problems whereby productive ideas are generated by collaboration between management and staff personnel, since both are working towards achieving a common objective. The human factors are a significant concern when preparing and designing banking systems which should be more than just a mechanical tool [318]. Participation of staff and users in the process of preparation and development of AIS performance has a significant impact on achieving the psychological satisfaction and decrease in the motives of resisting the system. Also, it raises the level of ambition, trust between management levels and improves the performance level. At the same time, in reference to management theories, individuals perform their tasks for the purpose of achieving personal objectives. Furthermore, over time, they feel satisfied and they work on achieving the objectives of the organization that is always keen to involve them, creating a sense of belonging to the team and ensuring public interest. Adam [319] argues that the notion of participation is one of the most successful methods, since it encourages verbal expression, participation in leadership and decision making, and relies on persuasion rather than commands and prohibitions. Most behaviourists agree that the successful participation of implementers in determining objectives, creates acceptance by those implementers for such set objectives and their loyalty to these objectives. This was emphasized by Khameis and Na'eseh [309], who maintain that involving system users in designing the new system, or developing a current one, creates a sense of their significance in developing their system. This ensures their acceptance of the new system or the modification to the existing system, and subsequently they are more likely to be committed to making a success of the system after implementation. In this regard, it is noticed that the commands and instructions mostly come from the higher management level to the lower management level, which weakens participation. Choe [46] argues that system development often faced stiff resistance from various groups in the organization; therefore, individuals should participate effectively in developing information systems. Therefore, the researcher argues that the concept of participation was merely a formal procedure that banks' managements adopt in order to force their views on other staff, where a counter feeling emerges against those proposals. Whereas, participation encourages individuals to think creatively about ways to achieve the bank's objectives in general and the IS in particular.

#### **6.2.3.6 Communicating Information**

Communication in the behavioural sciences is known as the process of transferring and receiving facts, opinions, feelings, trends and performance methods through codes from one

person to another. Accounting communication is the process of providing the accounting data through statements and reports to the parties that can comprehend it and make use of it in decision making. The communication method studies the reaction of individuals and groups towards realizing the message through accounting data and information [314]. Most of the previous studies emphasized the significance of accounting communication and saw it as a process of defining and measuring the communication of economic information to enable stakeholders to make appropriate judgments and decisions. Thus, the accountant should select the appropriate information for the person concerned, and the message should be treated in a manner that makes the recipient respond positively since every report should be organized in a way that suits the requirements of the decision maker. Developing new methods to present the accounting information is considered as part of the accountants functions. Also, developing the communication process is considered as one of the most significant elements of the development of AIS at banks, in order to enable sending the information to the concerned parties, comprehend it, and comprehend its expected objectives [320]. Information systems can have great impact on individuals' behaviours, actions, and decisions, particularly if the system designer understands how individuals' actions are motivated by personal factors that affect IS operations [302]. Providing the information in the required and comprehensible form depends on the adopted communication method, period, and type of user. Thus, it is obvious that the effectiveness of AIS can be increased if the message is carefully prepared and delivered. The system is more effective for decision makers and stakeholders if messages are kept short, frequent and with little time lapse between them. The clarity of information and the sequence of the messages being communicated affect the extent to which the recipient is able to fully comprehend the messages, and consequently the decision-making. Therefore, the accountant needs to determine the method and format of the data that will be delivered to the recipient and therefore affects his/her behaviour [320]. The researcher argues that there is a need for the staff of commercial banks in Jordan to emphasize on the communication of information to improve AIS performance since it plays a significant role in communicating appropriate, credible and attainable information precisely, easily and in a timely fashion to stakeholders. This is because the information required by the decision-maker is obtained through an information system that has a scientific basis and is prepared by specialized and qualified users of the system who handle its outputs.



## 6.2.4 Technical KPIs

Knowing how to operate and use the computer, its programs and accessories are considered important factors to consider in designing the modern AIS, bearing in mind that the computer is part of the IS [321]. Siam [320] pointed out that IT is not a target, rather a tool used by IS within an integrated and correlated system to support business and management, So the KPIs related in using technology are (Figure 6.5):

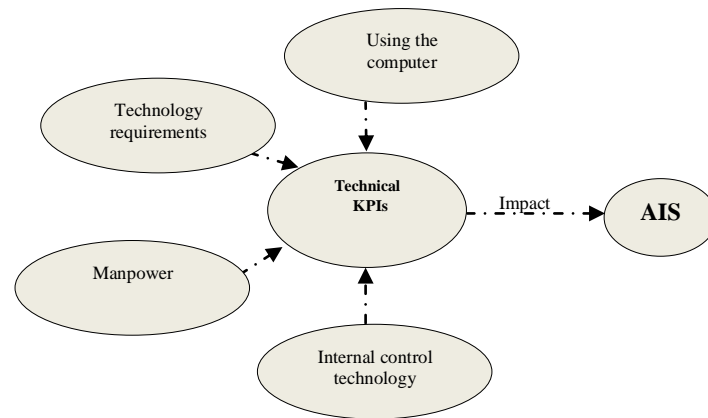


Figure 6.5: Technical KPIs

### 6.2.4.1 Using the computer

Dahmash and Qaraqeesh [322], argue that using the computer had an effect on the instruments, monitoring methods, preparing, operating, presenting, reviewing and checking the operation of the accounting information, but did not affect the objectives of the AIS. Some affects occurred resulting from the change in the nature of management and accounting works adopted by the organization. The banking activity in Jordan is one of the oldest ones that attracted the use of such devices and its programmes, since it requires speed and accuracy in extracting information and data. The success of computer necessitates the presence of massive number of similar operations of the same nature. This condition is available at commercial banks, as a result of the privacy of their activities, enormoussness and diversity, which is enabled using the computer vastly. Thus, a computerised AIS will speed up the process of providing and utilizing data, and producing many alternatives, thereby fulfilling the system's function of providing useful data that can be used for decision-making in the organization. Therefore, bank's management must consider technological developments in relation to banking services, and update accordingly. This requires familiarity with new scientific innovations, and the careful selection of computers and supporting devices. When buying these devices, consideration should be given to their purpose and appropriateness of use; built-in data processors should not be considered [320].

#### **6.2.4.2 Technology requirements**

Reimus [323] indicated that organizations have to provide whatever is necessary to make the best use of technology. The study also mentioned that there are many large and medium-sized organizations in various industries that do not get the value and the full benefit from investment in this technology. All of the commercial banks in Jordan, without exception, use technology in one way or another in their accounting activities since it provides speed [322], accuracy and flexibility in the preparation of various reports. Nevertheless, several weaknesses are noticed in using the maximum power of this technology in Jordanian banks [311]. The researcher argues that it is necessary to study the KPIs that would assist commercial banks in Jordan to more effectively utilize the available technologies. Also, it is necessary to provide modern technological devices and equipment in addition to professional staff, etc., and orient their management so that the performance of the IS in banks is improved, especially AIS performance.

#### **6.2.4.3 Manpower**

The success and effectiveness of the IS , primarily depends on the system operators as they must have a degree of scientific knowledge and experience that suits the requirements of the system and achieves its objectives. This means that system operators must continuously develop their skills, especially technological skills. Those operators must have the appropriate computer knowledge, in terms of operation and programming and how to use the related new technologies. The need for human resources imperative for AIS positions is represented in various positions such as data entry, programmers, budget analysts, financial comptrollers, cost accountants, systems analysts, managers of IS centres, and even consultants, since the computer is an accounting tool, not a substitute for the accountant. People who work in the IS field should have the necessary knowledge of technology, and associated new technologies, because they determine the effectiveness or otherwise of an AIS [59]. At the beginning of the third millennium, the accountant became more interested in the sources, dimensions and effects of the accounting figures, their sources from different databases, their true meaning and implications for the various processes of decision-making, especially from the viewpoint of different users of accounting information. However, this increased interest did not reach the expected level in Jordanian banks, which are still behind in this respect [317]. The researcher argues that due to several and constant developments in the modern business environment, it is necessary to continue developing staff skills in the integrated system of AIS and MIS,

especially in accounting, management and computers. This could be done by providing ongoing training courses and professional development so that staff can keep abreast of new trends in this field. Also, such training would contribute to continuing improvement of the system's efficiency and effectiveness so that ultimately the objectives of the commercial banks in Jordan would be achieved.

#### **6.2.4.4 Internal control technology**

Despite the great benefits achieved by technological innovation, it also presents many risks that affect various banking areas and activities in the commercial banks in Jordan, which must be identified and managed efficiently. The technical characteristics of the environment and IT are important factors that should be considered when analysing and designing IS and internal control systems in order to avoid the related risks and problems. This is difficult when implementing internal control technology in Jordanian banks. In such a case, senior management is responsible for building and developing reliable information and control systems and serve the environment, in order to keep pace with the rapid developments in IT, which led to the creation of many of the control risks and problems in the various activities of the banking business. The most notable of these are the regulatory risks and the risks related to the security and protection of banking IS, and preventing unauthorized access to the physical and logical components of the system. This requires first analysing and evaluating the surrounding risks in the process of building and developing efficient IS, in order to ensure the prevention and detection of errors and violations that might result from those risks. The opinions of external bank auditors are important as they affect the planning of the process of auditing and implementing its procedures, realizing, analysing and evaluating IT and systems. Also, the impact of their opinion on the internal control systems is one of the key factors that enable them to assess the degree of solidity of the internal control system, before venturing an opinion on the accuracy of the data. The state of the internal control system also enables an auditor to assess the validity of the financial position and bank activity outcomes, and avoid exposure to legal liability, and avoid questions from the stakeholders regarding the quality of the outputs of the internal control systems. This may lead to lack of trust in the information provided, which leads to poor decisions, migration of clients and loss of competitive advantage. In section 6.3, a discussion is provided of the impact that KPIs have on AIS performance in banks.

The previous literature on the internal control systems of banks in Jordan suggests that the KPIs of these systems need to be improved in terms of IT, since the role of IT has increased

in all areas of banking activities. All business sectors have witnessed an improvement in the services they provide by making the most of what IT has to offer; innovations and new applications all contribute to producing high efficiency, promptness and high performance. However, internal control is still limited as a result of complicated manual procedures still being used, and the absence of a mechanism to control work and staff efficiency. The concept of internal control in such banks is narrow since it aims at monetary protection. A set of procedures and rules (internal control) were adopted for monetary control and financial transactions, primarily to protect banks' monies and assets from fraud and loss. The researcher argues that internal, financial and management controls should be assessed and monitored in order to determine the strengths or weaknesses of the mechanisms adopted by banks. The improvement of such controls would inevitably lead to improvement of bank activities and services, and managements. An effective control environment would decrease the incidence of fraud and policy violations, if designed and implemented properly. It could also reassure the bank's management that the bank's control objectives are being achieved. The use of IT techniques for internal control is one means of reforming a banks' financial and management strategy. Thus, it is necessary to fully exploit the potential of AIS in internal control, in order to make the most of such systems in the workplace and to increase awareness of auditing by using computer programs and systems and auditing methods and the extraordinary benefits that such methods bring to internal control. Furthermore, it is important that parties responsible for control build an integrated electronic database related to all aspects of internal control.

### **6.3 Reflections on how of KPIs impact on AIS performance in banks**

Based on the above discussion, it is noticed that there is a group of KPIs that are different and have multiple classifications that impact on AIS performance in the commercial banks in Jordan. This has led to problems related to several aspects of AIS performance (Figure 6.6). The researcher will discuss how weaknesses in the existing AIS performance in the commercial banks in Jordan are affecting the competitiveness, stakeholders and internal control systems as shown in Figure 6.6 below:

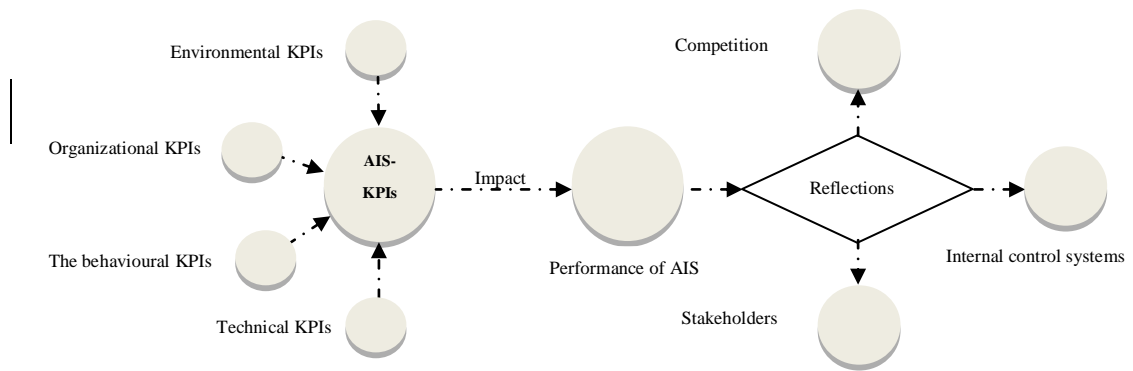


Figure 6.6: KPIs' impact on AIS performance in banks

### 6.3.1 Weaknesses of current AIS in Jordanian banks: Impact on Competitiveness

The researcher has noticed the changes in the international banking system resulting from events that contributed to the liberalization of its activities, leaving the local banks in Jordan to face new competition, not only from foreign banks, but also from financial organizations. Those new competitors are competing with banks in their customary functions as intermediaries between investors and saving clients, which created large competition. Thus, competitive pressure has increased steadily over the past decades, forcing banks to modify their strategic approaches and motivating them to reduce costs, increase revenue and improve performance in order to survive and grow. There is no bank that can sustain a competitive environment for a long period without growth and development. Banks are facing big regional and international challenges since they already operate on a wider than local scale, as is the case of Arab Bank, though Arab Bank in Jordan leads a group of large banks across the Arab world and in other countries. Non-Arab, international banks are not actually involved in competition with the Arab Bank in these markets. Because of the international business or European-Jordanian partnership, the bank should expand its capital base and diversify its business fields [324]. It is also worth mentioning that banking competition strategy in the developing countries still needs intensive research and study in order to provide stakeholders and decision-makers with up-to-date information that would assist them in establishing a vision for performance and formulating control strategies and policies in the banking sector [325]. Thus, under the pressure of increasing competition, banks which do not allocate their resources efficiently to enhance their productivity will perish, unless they adopt the same policies and procedures as those of their competitors. Banks need to be proactive in order to improve their efficiency, not just think about it.

Efficiency and better performance are critical to a bank's strategic development and growth, and hence to its survival [326]. The weakness of existing AIS performance in banks impacts on their competitiveness; this is clarified below.

### **6.3.1.1 Inability to satisfy their Competitiveness**

The previous literature suggests that internal and external environmental KPIs affect AIS performance resulting in a decrease in the competitive advantage of the commercial banks in Jordan [30, 298]. The process of environmental analysis is still not attracting sufficient attention. There appears to be a lack of awareness that competitive advantage can be gained by building up existing strengths and eliminating weaknesses. However, simultaneously, banks must take advantage of the opportunities arising in their external environment, which will enhance competitive advantages, if utilized properly. In the commercial banks in Jordan, it has been found that there is a positive relationship between environmental KPIs analysis and the competitive edge enabling banks to face future competitive challenges. Previous literature, which focuses on AIS-KPIs and their relationship with competitive advantage, maintains that the issue is still fuzzy. This makes it difficult to determine the relationship between competitive advantages as a significant factor in achieving the target strategic objectives of the commercial banks in Jordan. Hence, it is difficult for banks to determine the strategy that will be most appropriate as a means of achieving specific competitive advantage. Another problem is the banks' difficulty in determining their current and future competitive advantage in light of the strengths that constitute their competitive advantage. The reason for this problem might be [30, 208, 298]:

1. The difficulty of diagnosing the environmental AIS-KPIs that achieve the competitive advantage.
2. The difficulty of determining the strategy that improve the performance of the environmental AIS-KPIs that achieve the competitive advantage.
3. Fuzziness in determining the environmental AIS-KPIs that indicate the success or failure in such banks' competitive performance.

The researcher argues that despite banks in Jordan showing competitive advantage, this advantage is still within the lower limits. The same applies to environmental analysis, since it did not greatly develop. Therefore, the commercial banks in Jordan need to focus more on improving and developing the environmental AIS-KPIs. This is especially important since

the Jordanian banking market is facing strong competition from new banks or from existing banks which are being restructured. An improvement in the performance of environmental AIS-KPIs that produce competitive advantage cannot be achieved without access to all opportunities and challenges in the banking environment, and without recognizing existing strengths and weaknesses. Thus, an analysis of the environmental AIS-KPIs is a vital step in the creation of banking strategies. Some of the previous studies suggested various KPIs that affect the organizational AIS performance; include: the organizational structure, management policies, training, skills, incentives, etc. Most of the previous literatures revealed a strong relationship between the organizational KPIs and competitive advantage in the commercial banks in Jordan. However, these banks were affected by the international financial crisis and were working in critical circumstances and against intense competition. These issues had a significant impact on the banks' role in achieving competitive advantages and simultaneously weakened innovation and creativity; moreover, the management personnel of banks ignored the importance of group collaboration and collective responsibility. At the same time, there was confusion between responsibilities and authorities and a fuzziness of management policies and applicability. In addition, there was little concern with financial and moral incentives, and staffs were given very few opportunities to improve and develop new skills. Such issues have both a direct and indirect impact on competitiveness, since banks with modern techniques are better able to face competition. The researcher concludes that managements of commercial banks in Jordan have to search for methods that foster a better organizational environment, thereby encouraging staff to be creative and provide new ideas to develop and improve current services. The researcher argues that studying KPIs that affect the performance of the organizational AIS based on a diversity of qualifications, experiences and skills, together with equipping them with new methods, would result in constant performance improvement. It is also necessary for management to make intensive efforts to ensure ongoing improvements so as to maintain a competitive edge.

Staff behavioral KPIs in the commercial banks in Jordan affect AIS performance. Such KPIs include the behavioral modes, staff job satisfaction and the satisfaction of the users of a system's outputs. This necessitates considering many AIS factors such as the prevailing social, moral and technical values in the society, in addition to the cultural framework and the reaction to banking products and their developed technologies. Thus, such AIS would have a direct impact on banking performance, consequently on AIS as the outputs of this performance. The impact of the previous AIS becomes obvious in its efficiency and

effectiveness in the banking sector, which enhances banks' competitiveness status. The researcher argues here that managements of commercial banks in Jordan have to consider staff behavioral factors when improving and developing the behavioral AIS-KPIs. Also, they should increase awareness of their impact on AIS in general, and the necessity of involving them in AIS reconstruction and development, which would result in staff job satisfaction and improved customer service. At the same time, this would make use of the behavioral modes in improving their competitive status. Involving staff in AIS reconstruction and development would have an impact on achieving psychological and job satisfaction, which would positively affect services provided and enhance competitiveness.

Generally, previous studies revealed that the technological KPIs have a significant impact on the efficiency and effectiveness of the AIS used in the commercial banks in Jordan. This is a result of the nature of banks' business and the international competition which prompted banks to embrace technology in an attempt to achieve a higher degree of accuracy and speed in conducting their operations. Most of those studies pointed out the necessity of discussing the technological KPIs in order to have a clearer and in-depth knowledge of their impact on the type and quality of services provided. The researcher concludes that giving more attention to the technological AIS-KPIs has an impact on competitiveness as they result in changing the types of services provided to customers. Also, this would result in faster accomplishment and control of operations, in addition to lowering and controlling cost. The technological AIS-KPIs contribute to developing systems' outputs and improve their quality, resulting in the improvement of the efficiency and effectiveness of AIS performance, with a subsequent improvement on their competitiveness level.

### **6.3.2 Weaknesses of current AIS in Jordanian Banks: Impact on Stakeholders**

In terms of final reports that bank managements sent to stakeholders, it emerged that most banks in Jordan suffer from general weakness, which in turn leads to the lack of objectivity in decision-making. Also, the centralization and non-delegation of authority in decision-making weakened bank employees' commitment and team spirit, and the banks' credibility with foreign parties concerned. Thus, the lack of follow-up procedures, and the intentional or unintentional errors in decision-making have weakened the confidence in banking



department staffs' ability to make decisions or subsequent decisions related to the same decision. This has had an impact on the stakeholders as explained below.

### **6.3.2.1 Inability to satisfy Stakeholders**

The researcher concluded from the previous studies that the internal and external environmental KPIs impact on AIS performance which resulted in lack of ability to satisfy stakeholders' interests and fulfill commercial banks' objectives. Since stakeholders are related to the bank's environment through various effective relations with various dimensions and trends, if any defect occurs in the balance of such relations, it will affect all the parties concerned. The researcher argues that the effective environmental AIS-KPIs should cover all issues related to stakeholders including: social benefits, social service, social appreciation, vast response to stakeholders' needs and expectations, etc. The stakeholder issue is one of the most significant issues in strategic management, since it represents an environment of integrated relations, and organizational interactions with the Jordanian banks' internal and external environments. Improper management could threaten a bank's existence. In addition, organizational KPIs have had an impact on AIS performance which resulted in inability to fulfill stakeholders' interests and commercial banks' objectives. Banks face a number of obstacles and challenges, mainly the absence of AIS that control policies, and the procedures that control the functions of the organizational KPIs in managing their relationships with stakeholders in their internal and external environments. Such obstacles and challenges include deficiency in determining their role and relationship to activating the perspectives of sustainable development. Moreover, there is the absence of actual plans and policies in order to determine the nature of their impact and merge them into future strategies. The researcher argues that it is necessary to study the impact of the organizational KPIs that influence AIS performance so that banks can overcome obstacles and successfully meet challenges. All of the organizational AIS-KPIs should be transparent and included in procedures and policies that govern them to achieve satisfaction for all of their stakeholders and users. Although previous studies affirmed the significance of using technology in improving performance in general, they referred to the obstacles and negative strategic impacts of using information and communication technology systems. They believe that this is due to the fact that such IS are built by external parties and that managements are not concerned with providing their staff with appropriate training in IS and communication technology. Also, they attributed this to not giving internal stakeholders (staff) the training opportunities to use the upgraded technologies. In addition, there is the disadvantage of using various computer networks

(local, regional, internet, etc.) in internal and external marketing. The researcher argues that stakeholders' change of wishes and requirements, the rapid progress of banking technologies in IS and communication, and progress in providing services to clients anytime and anywhere requires establishing a strategy that guarantees achieving all these AIS-KPIs. Such strategy should include stakeholders who benefit from this technology, including staff and clients alike, where AIS performance and their related systems are synchronized with the technology in use to cater for stakeholders' interests.

### **6.3.3 Weaknesses of current AIS in Jordanian banks: Impact on the Internal Control Systems**

The most significant conclusion reached by the researcher is that internal control systems are facing many challenges related to controlling KPIs, including a general weakness in documenting most of the accounting system operations. Moreover, another drawback to consider is the complexity of accounting processing procedures conducted through computerized systems, and the difficulty of tracking the operations because of a flaw in the automated tracking mechanism. At the same time, there is also the difficulty of operating the system in the absence of qualified IT staff. The intangible nature of AIS and the absence of documentary authentication for most of its operation have contributed directly to creating several problems, in particular the security issue of protecting the system from intrusions, and protecting bank clients' data. Consequently, such problems have produced a general weakness in the performance of internal control systems and the reliability of their outputs. These problems have revealed the inability of these systems to overcome obstacles, and reduce the operating costs in the long run, which in turn have contributed to the reduction of banks' competitiveness. This forced commercial banks in Jordan to seek the best means and methods to ensure the implementation of comprehensive performance assessment systems, and ensure that their operations reflect their surrounding environment and strategies. Moreover, banks need to use performance evaluation systems which do not focus only on evaluating and measuring performance, but rather on improving the AIS' performance, which is also very significant to banking activities. The research problem is discussed in more detail in the following sections.

### **6.3.3.1 Inability to satisfy the Internal Control System**

The researcher concluded from the previous studies that:

- Internal and external environmental KPIs have impacted on AIS performance resulting in the weakness of internal control systems in the commercial banks in Jordan. The main factor in the internal control is the control environment, since it significantly influences the control process. The KPIs related to the economic, political, social, cultural and legal circumstances and factors have significant impact on the control system and the extent to which it achieves its aims since such ISs are open systems that influence or are influenced by the surrounding environment comprising legislation, competitive status, and social culture. The researcher argues that it is necessary to understand and take into consideration the surrounding environmental KPIs when preparing and developing AIS, especially in relation to the market, competitiveness, and rules and laws related to bank operations, in order to ensure the continuing effectiveness of the system. The existence of an effective control environment helps to decrease the incidence of fraud and violations, if it were properly designed and implemented. It also can provide a reasonable assurance for bank's management that the banks' control aims are being achieved.
- Internal and external organizational KPIs impacted on AIS performance which resulted in weakness of the internal control in the commercial banks in Jordan. This weakness influenced the internal control system's outputs of its operations and tasks in terms of jobs, exchange of information, coordination mechanisms, communication between various departments and staff, organizational structure and job descriptions. The researcher argues that an AIS needs several additional control attributes related to job performance and organization. Also, it is necessary to develop the rules, regulations and laws of the commercial banks in general and AIS in particular.
- The behavioral KPIs have an impact on AIS performance which results in weakness of the internal control in the commercial banks in Jordan. This weakness is witnessed in the actions of those who prepare and use IS. Also, it can be seen in their attempts to understand various parties' information requirements, the conflict of various stakeholders' interests in information requirements, and staff participation in preparing and developing IS. The researcher argues that it is necessary to direct the behavioral AIS-KPIs so as to continue to recruit individuals who have specialized scientific qualifications in the field of accounting appropriate for the size and level of tasks and functions. Also, there is a need to be concerned with the scientific and

professional training and qualifications of accountants and those in AIS, such as programmers and AIS system analysts, and to motivate and develop their control behaviors.

- The technological KPIs impact on AIS performance which weakens the internal control system of the commercial banks in Jordan. Although these banks have internal control with IT systems, their use is limited because the huge developments in methods and techniques are ignored, thereby losing the potential for efficiency, speed and high level of performance. The researcher argues that the function of financial and management internal control is assessment and control for the extent of strength and weakness of the adopted mechanisms used by banks in Jordan. Improvement in activities and services would improve their subsidiary managements' performance. The utilization of IT methods for internal control is one of the components of the financial and management reform strategy for such banks.

## **6.4 Problem of the study**

Considering the negative reflections discussed in the previous section, it is noted that the impact of KPIs problems on AIS performance in the commercial banks in Jordan is a pressing and significant issue, especially in the KPIs field that enhances the AIS' performance. The problem that the researcher identifies to solve in this study is:

What are the KPIs that will improve the accounting information systems' performance in the commercial banks in Jordan?

This need to address this question arises from the absence of a strategic vision in the litterateur to develop and improve the AIS' professional performance in commercial banks in Jordan. Also, it highlights the importance of investigating the KPIs that lead to improving AIS performance in the commercial banks in Jordan. This study will also solve some sub-problems, such as:

1. What are the major KPIs that have an impact on AIS performance in the commercial banks in Jordan?
2. What are the KPIs major classifications that have an impact on AIS performance in the commercial banks in Jordan in accordance with BSC perspectives?

3. What are the sub-KPIs of the major KPIs that have an impact on AIS performance in the commercial banks in Jordan?
4. What are the sub-KPIs that have an impact on AIS performance in the commercial banks in Jordan in accordance with BSC perspectives?
5. What are the relationships and links between the major KPIs and sub-KPIs that determine their impact on AIS performance in the commercial banks in Jordan?
6. What are the strategies required by the commercial banks in Jordan in order to improve their AIS performance?
7. How does one verify the validity of a BSC form to test strategies and KPIs that improve AIS performance in the commercial banks in Jordan?

The strategies that could be adopted to improve AIS-KPIs performance in the commercial banks in Jordan, the performance perspectives to be used in classifying these KPIs, relations of influences and impacts on performance perspectives and KPIs themselves regarding achieving improvement strategies, are discussed. Finally, the suitability of those KPIs is examined in terms of their practical application to the commercial banks in Jordan. In the next section, the researcher discusses the significance of this study and the features that differentiate it from others, thereby making it unique.

## **6.5 Significance of the study**

The review of previous studies showed that: there are differences in the tested fields, the various organizations' activities, the adopted perspectives, and the statistical approaches used to obtain the information for the purposes of analysis. This study differs from others because it has adopted a different variable. This study discusses the application of this concept to Jordanian businesses in particular, and to the Arab businesses in general. This study does not focus on a "case-by-case" implementation, but rather, uses a scientific basis for the proposal of a general framework that provides a balanced evaluation measurement for strategic performance. This is intended to rectify the deficiency in AIS performance for the purpose of initiating feasible applications and theoretical studies in this field. The main contributions of this study are:

1. This study addressed this topic in the context of the Jordanian environment and its social, political, cultural, economic, legal and technological capabilities which differ

from those of the previous case studies described in the literature. As far as the researcher knows, no previous study has focused specifically and comprehensively on AIS improvement in Jordanian commercial banks.

2. Most of the studies discussed the KPIs that influence the efficiency of the IT, but this study identifies the KPIs that improve the AIS applications in Jordanian commercial banks. Previous studies aimed to show the scope of KPIs' effects, but this study attempts to determine the extent to which these KPIs influence the AIS performance improvement.
3. Most of the previous studies do not propose an integrated framework that includes the most important KPIs that influence the AIS performance. However, this study considers the KPIs as several packages, not as an individual package as previous studies have done.
4. Most of the previous studies provided only a partial discussion of the objective which this study covers. This study focuses on the most essential KPI measuring factors that impact on AIS and its performance improvement. The approach taken here is more comprehensive and analytical, since perspectives are considered here that have been ignored in other studies.
5. Apart from the BSC module, at the business organizational level, there have been other developments as indicated by previous studies. However, the researcher believes that if the BSC is used to develop AIS performance, banks can benefit significantly. Moreover, the AHP/ANP pyramidal application analysis is a pioneer mathematical theory that will ensure objectivity and provide more accurate and precise results.
6. Apart from very few previous works, most studies conducted analytical, philosophical and theoretical trials without considering their practical application to business organizations. This study proposes a practical, applicable framework intended to improve BSC application and also examines the possibility of improving AIS performance in Jordanian banks by using BSC.
7. BSC and AHP/ANP applications are intended to increase the capability and efficiency of the business priorities, since each one of them integrates the other in building a clear vision and strategy through the organization itself using the vision and strategy of AIS management in banks. Therefore, it is expected that this integrated application will improve AIS management capabilities so that they can

develop their strategies in a more efficient way to achieve both short- and long-term goals, and to very precisely provide a detailed account of annual performance.

8. Apart from the studies conducted in Jordan, most of the previous studies related to this research topic were conducted in environments that differ from the local environment and their results were used as a reference, despite environmental and case differences.
9. The methodologies used in previous studies were based on a similar statistical approach when studying KPIs and testing the study assumptions. Some of them focused on the importance of using observations and questionnaires as data collecting methods. In this study, the researcher will combine both of these (besides the other methods mentioned in the “open way” part of this study) for the field study described in Chapter 8 of this study. To the best of the researcher’s knowledge, this is a unique approach that has not been done in the literature till now.

## **6.6 Conclusion**

The discussion presented in this chapter demonstrates that the problem addressed by this study emerged as a result of examining the actual, real-world problems facing commercial banks in Jordan in their attempts to improve AIS performance. The problem encapsulates the difficulty of determining KPIs for AIS implemented in the banks, due to their variety and multiplicity of obstacles. On the other hand, it is necessary to acknowledge their limitations and identify the extent to which KPS can improve the AIS’ performance in the commercial banks in Jordan. Hence, the researcher notes that some aspects of the problem are related to AIS performance, while others are related to improving the strategic function of the AIS in terms of improving competitiveness, providing information to stakeholders, and increasing the efficiency of the internal control system. This leads to a better understanding of the problem and the proposal of a mechanism to improve the quality of the AIS function in commercial Jordanian banks. In this chapter, the researcher discussed: KPIs that influence AIS performance in the commercial banks in Jordan in several fields; the basic classifications of KPIs adopted in the previous literature (environmental, organizational, behavioral and technical); and the influence of sub-classifications of each KPI. The researcher also discussed the reverse impact of each perspective on AIS performance in the commercial banks in Jordan in terms of competition, the stakeholders and the internal control systems. The researcher defined the major problem of the study by determining the

KPIs that improve AIS performance in the commercial banks in Jordan. Also, the researcher defined the related sub-problems such as the improvement strategies, the influence of relationships, the influence on the perspectives, and the levels of KPIs that help to establish the required strategies. In the last part of this chapter, the researcher discussed the significance of this study and its related difficulties. In Chapter 7, the researcher discusses the methodology applied in this study, defining its basic problems and their related sub-problems, methods, techniques and tools used; a comprehensive and accurate methodology is chosen which takes into consideration all related issues.



## **Chapter 7 -**

# **Research Approach and Methodology**

### **7.1 Introduction**

The previous chapters presented the theoretical background of this study through a critical review of previous studies. In addition, the problem that will be addressed in the present study has been discussed. This chapter describes the research methodology and procedures of inquiry that are used in this study to achieve the objectives. This chapter is divided into 10 sections. Section 7.2 presents the study goal and Section 7.3 presents the research approach. Section 7.4 presents the adopted research methodology in this study. Section 7.5 explains the BSC methodology. Section 7.6 presets the levels led to improve the performance of AIS are explained. In Section 7.7 and Section 7.8, the process of forming a BSC by using Analytical Hierarchy Process (AHP) and Analytic Network Process (ANP) to improve the performance of AIS, Section 7.9 explains the methodology of the survey (quantitative approach) and the chapter concludes in Section 7.10.

### **7.2 Study goal and research approach**

Before describing the research approach, in this section, the researcher presents the goal and objectives that are aimed to be achieved in this study.

#### **7.2.1 Study goal and objectives**

The goal of this study is to improve the performance of AIS in commercial banks in Jordan, by identifying the KPIs and analysing the relationships between them to achieve the AIS goal using the BSC (balanced scorecard) approach. This will be achieved through the following objectives:

1. Identifying the various key performance indicators (KPIs) that affect the AIS performance of commercial banks in Jordan.
2. Using BSC to classify the KPIs that have been identified in the first objective, according to the perspectives and goals.
3. Identifying the sub-indicators of the KPIs for the various perspectives of BSC that have been identified in the second objective.
4. Studying and analysing the relationships and links among all KPIs and sub-KPIs. This is done by using BSC and identifying impact on AIS systems implemented in the commercial banks in Jordan.
5. Developing strategies to improve the performance of AIS in the commercial banks in Jordan. This is based on the results obtained from the previous objective.
6. Establishing a logical framework of the comprehensive relationships, among the KPIs and sub-KPIs on one hand, and the KPIs and strategic objectives, on the other hand and also to improve the performance of AIS of commercial banks in Jordan. It is also intended to assess the KPIs according to their importance in achieving the strategic objectives.
7. Validating the proposed BSC model to test the KPIs which will lead to improving the AIS performance in commercial banks in Jordan.

In the next sections of the chapter, the researcher will discuss the importance of these objectives to address the goals of the study.

### **7.2.2 Importance of objectives to address the defined problem**

To achieve a goal, it is well-known that different objectives must be achieved first. In some contexts, researchers call such objectives ‘tactical’ or ‘operational’ objectives. These objectives vary according to their role and purpose, but their common purpose is to meet business requirements and perform various activities, to serve the overall objective [327]. It is also known that it is very difficult to measure the overall objectives and the overall strategies, since each overall strategy or objective has many sub-objectives, which must be achieved in order to achieve that overall strategy or objective. These objectives are measurable, and moreover, are distinguished by being measurable, able to be monitored, and able to be corrected. Each objective needs a specified action plan, programs and activities and every activity or program should be achieved according to a time schedule. It is easy or

it must be possible to measure performance through the implementation of objectives that are an essential part of the general plan [327]. Another type of objectives can be formulated by initially answering questions such as: What are the researcher's priorities and what does s/he want to achieve? What distinguishes a strategic objective from the other objectives that cannot be dropped without jeopardising the achievement of a vision and mission? Also, the other objectives such as tactical or operational ones are not required for themselves but as a means of achieving a greater objective. Upon analysing vision and mission of AIS, it is possible to extract the strategic purpose or objectives. It is possible to add to the overall objectives or divide them into smaller objectives in order to facilitate the process of identifying them. This is exactly what the researcher adopted when developing the BSC model in this study, which will be discussed in this chapter. While developing the objectives, the researcher referred to the previous literature and relevant experiments conducted in this area, in order to fully appreciate the current situation of AIS in the Jordanian banks. This gave the researcher the necessary background and information enabling him to judge the contemporary professional performance of those systems, and be aware of the professional skills necessary to adopt BSC. These skills include: analytical reasoned thinking, creative thinking, ability to understand the characteristics of AIS users, contemporary concepts, principles, methods and technologies in AIS, while developing the objectives. It is also significant to know about the risks, how to assess and address them, and the opportunities available for the contribution of management. Finally, identifying how to develop the overall objectives, as well as the specific ones based on previous work that requires improvement, requires certain skills and assessment of modern quantitative and qualitative measures. This will help with the preparation of databases for this field of AIS.

### **7.2.3 Rationale behind the identified objectives to address the goals of the study**

For the purposes of this study, traditional methods of formulating and testing the hypotheses were eschewed since the objective was to detect the KPIs' standards that produce improved AIS performance in the commercial banks in Jordan. Hence, in order to achieve the objectives of this study, many prior relevant researches were examined in order to develop a scientific basis for AIS which is still an area open to controversy, and scientific and professional research in IT and accounting literature. The objectives of this study were established after examining the facts presented in previous literature, and looking at new models and methods which have proved to be scientifically and practically efficient, and

offer new techniques for improving the AIS' professional performance. This study attempts to introduce a scientific proposal that offers a practical application to banks in Jordan. The reason for identifying the above mentioned objectives is to provide a comprehensive reason behind the purpose and the achieved result. This ultimately leads to achieving the study objective by using a scientific methodology. Hence, in this study, objectives were established after a review of the results of previous studies which examined KPIs' impact on the AIS performance in banks in terms of types, components, characteristics and their significance (first objective), in an initial attempt to clearly identify them and establish the basic study approach. Bearing in mind the results of studies that dealt with the BSC concept [157, 199, 250, 328], the researcher has chosen to use this BSC (second and third objectives) to achieve the goals of this study. Also, this tool is practical, has the ability to derive and apply KPIs in practice after they have been tested and their credibility proven in most business organizations. Some studies analysed hypotheses that BSC is based on [145, 216, 288], and confirmed the correlation of the financial and non-financial standards through a causal relationship, and the method of establishing strategies (fourth objective). This is necessary in order to arrive at the next objective (fifth objective) which aims to develop strategies to improve the future AIS performance. To describe the BSC model through multiple perspectives in various environments, researchers have reviewed its development in the accounting theory field that expresses a business organization's strategy and its vision reflected a set of objectives and standards according to various perspectives. This significant part of this study discussed the potential reasoning which ensured the sound measurement of integrated performance in providing the basic information to achieve the strategic objectives. It also revealed that there are deficiencies in some current BSC because they do not include all of the business organizations' activities [208]. This issue necessitated the acceptance of the BSC, and omitting or ignoring any of its elements that might prevent the model from formulating accurate KPIs for the perspectives of the BSC model in the future (sixth objective). Previous studies [208, 252, 280] also revealed that they were limited to presenting analytical viewpoints and making theoretical attempts to address the issue, without focusing on the practical application in business organizations, especially commercial banks [208]. Thus, the researcher undertook to detect all methods or means that ensure the validation of comprehensive KPIs that align with the surrounding environment and strategies of this sector of banks in Jordan. Furthermore, this is used to verify whether the BSC validation results are positive (seventh objective). After concluding this part of the study, the researcher was able to design a research approach which is presented in Section 7.3.

### 7.3 Research approach to achieve the objectives of the study

The research approach is a basic requirement of any research and an important phase that must be completed before starting with the practical implementation of the study procedures. The research approach is a work project, or an organized plan that combines elements of critical thinking necessary to achieve the purpose of the present study, as shown in Figure 7.1.

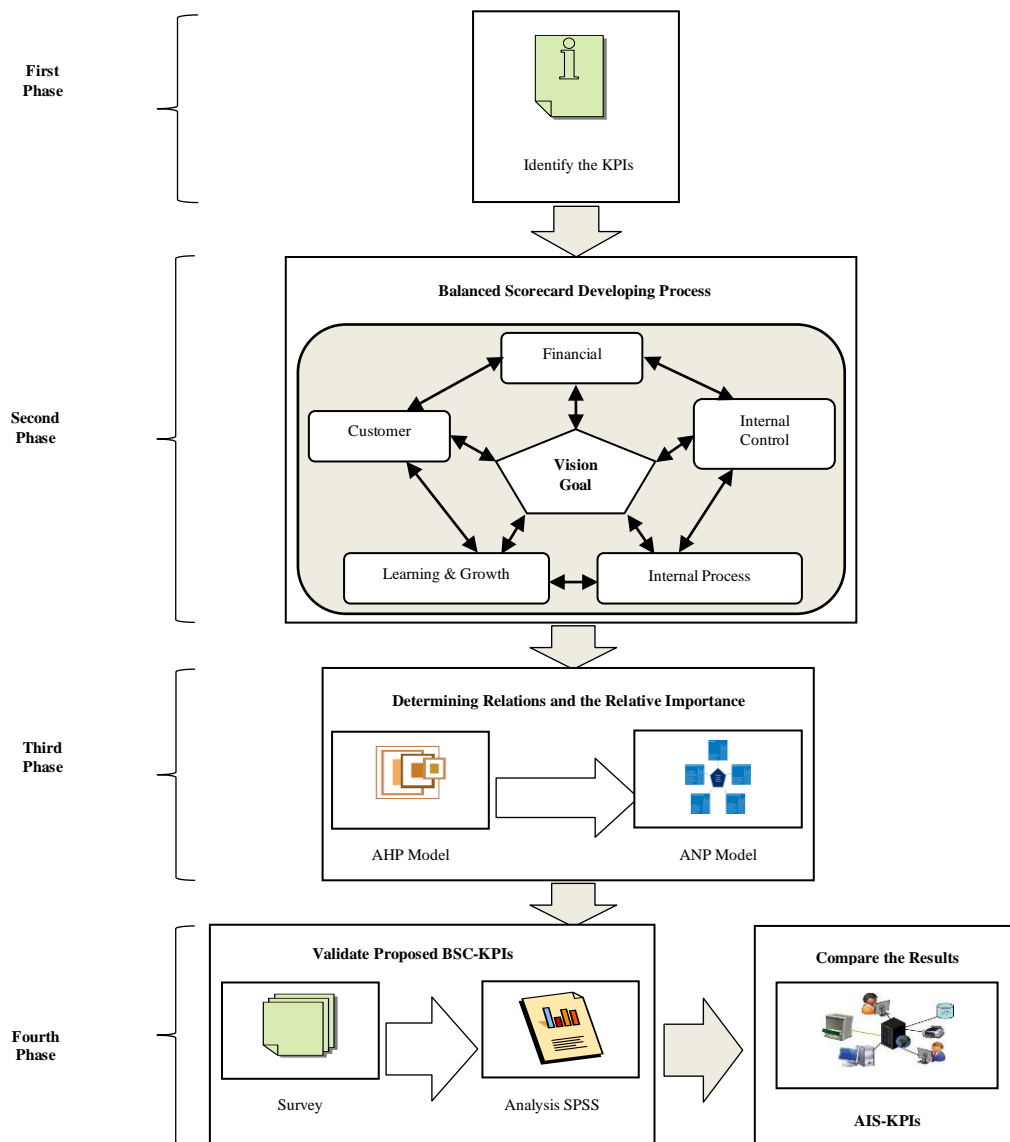


Figure 7.1: The research approach phases

The research approach is useful in simplifying the processes that link good ideas to the implementation of strong real practices [329]. Therefore the research approach is intended to achieve three purposes which are [329]:

1. Describing the procedures and requirements of the study.
2. Establishing the steps and phases of implementation.
3. Establishing an approach to assess the study during its implementation phases and after completion.

The development of the research approach included a series of logical steps, adopted by the researcher to design a study plan based on figures from the Jordanian commercial banks. To reach the essence of AIS strategic planning, the researcher posed several significant questions which helped in the planning process and followed scientific guidelines for planning and BSC strategy [201, 330]. The questions identified are:

1. Where do the Jordanian commercial banks stand today in terms of AIS?
2. Where do the commercial banks in Jordan want their AIS to be in the future?
3. How the banks move towards to reach the future goals?
4. How do the banks measure the progress during the transition process?
5. How to correct the path and adjust the way if necessary?

These and other questions were very significant for designing the plan of this study and overcoming any errors in advance. This process also required team cooperation to complete what is required. The team needed to have qualitative leadership capacities and skills from the highest personnel in the banks and people from academic areas related. Once the team was formed, it was invited to do the following:

- a. Collect and gather the required data and information about all aspects of the status of banks. In addition, the team was required to identify the (strengths, weaknesses, opportunities and threats) which are faced by the banks. All of this was done to prepare for the assessment of the status of the banks by analysing the current internal environments.
- b. Invite experts to analyse the current status and identify what is required from the decision-makers in Jordanian commercial banks. Also, the analysis was intended to determine what is required from bank experts, consultants and university professors in this regard.

- c. Prepare a final draft of the plan then distribute it to the relevant departments of commercial banks in Jordan, to study it and submit their comments and recommendations.
- d. Draft an action plan and prepare sub-plans for each objective to be achieved in line with the overall work plan.
- e. Valid the developed action plan and the accompanying supporting plans in the various phases to conduct the corrective actions, if necessary.

The proposed research approach outlined in Figure 7.1 is explained in detail in the next section.

### **7.3.1 Plan of implementing the study**

The goal of this study was achieved by implementing its objectives as mentioned previously, based on thoroughly studied procedures which were applied before, during and after conducting the study. The objectives identified were implemented in four key phases as shown in Figure 7.1.

**First phase:** The study referred to the relevant theoretical and practical literature, which provided an overall review of the required KPIs in terms of their characteristics, significance, concept, vulnerability, impacts, relationships and functions. The aim of this phase is to identify the KPIs and present the facts about AIS and the KPIs affecting their function. Moreover, it helps to ascertain each KPI's function in order to determine the mechanism of handling them in the next phases; this represents the first objective of this study.

**Second phase:** In this phase, the study identified KPIs that are classified into different perspectives. These KPIs were necessary to assess the impact of BSC on the AIS, and will play a significant part in improving the performance of AIS from the various perspectives of BSC. The KPIs were categorized according to: finance, customers, internal processes, learning and growth, and internal control perspectives. This phase mainly relied on the results of the first phase while it, simultaneously, depended on the theoretical field and empirical studies related to BSC, its concept, significance, benefits, perspectives, procedures, and its application conditions in general and in banks. Additionally, in this phase the sub-KPIs of the BSC were identified and classified into different perspectives. In this particular part, the researcher relied on previous theoretical literature and the practical experiences of BSC in commercial banks. Simultaneously, the researcher considered the fact that each study

has its own characteristics that distinguishes it from others. Therefore, the researcher visited several Jordanian commercial banks to know more about the nature of work in these institutions, especially AIS and BSC systems, and to study the various related factors that may influence their work. The aim of this phase is to classify and identify the KPIs and sub-KPIs into the various perspectives of BSC (identified in phase 1). This assisted the researcher to study how the KPIs will affect the use of BSC in the future which will be studied in the second and third objectives of this study as mentioned in Section 7.2.1.

**Third phase:** An initial proposal of the BSC model for the present study was developed by following the mechanisms studied in the first two phases. Also, the vision was identified and strategic objectives of commercial banks in Jordan were established in relation to AIS and in the light of the views of some leading figures and academics involved in the field of commercial banking. The AHP/ANP model was also used to determine the logical relationships among the sub-KPIs, and also the relationships among sub-KPIs and BSC aspects. The aim of this phase is to analyse the relationships among all BSC elements to ensure the development of a strong strategy that can improve the performance of AIS in the Jordanian commercial banks. This represents the fourth, fifth and sixth objectives of this study as mentioned in Section 7.2.1.

**Fourth phase:** The tool of the study was prepared in the form of a questionnaire based on the results of the third phase. The questionnaire, in its final version, was then distributed to the subjects of the study, i.e., individuals working in Jordanian commercial banks. Further, the results were analysed and compared with the outcomes of the third phase. The aim of this phase is to test the validity of the third phase outcomes on the BSC-KPIs to detect KPIs that contribute to improving the performance of AIS in the commercial banks in Jordan, which is the general goal of this study, in the fourth, fifth and sixth objectives of this study. This represents the seventh and eighth objectives of this study as mentioned in Section 7.2.1.

After reviewing the various phases of this study, the researcher believes that the procedures conducted must also be reviewed in order to explain their mechanism of implementation in detail, regardless of the timing provided for the previous phases as the previous phases can never be separated from one another, in practice. In the next section, the researcher discusses the research methodology adopted in this study.



## 7.4 Research methodology adopted in this study

The study will use a hybrid approach of research to conduct the research [331]. A hybrid or mixed method research is ‘an approach to inquire, it combines or associates both qualitative and quantitative forms in the same study’[332]. Related studies use this approach to give a better understanding of a phenomenon. In addition, more insight will be gained from using the mixed method approach than following a qualitative or quantitative approach alone. It is also used when there are inadequate or unavailable instruments [333]. In today’s research, a mixed approach is often preferable as it allows an issue to be investigated more fully, leading to better support for and strength of its findings. The mixed method is favored in human and social studies used in the universities and academic institutions as a tool to obtain data, information, knowledge and theories able to interpret and realize social phenomena [334]. The researcher made use of the characteristics of this methodology in presenting and analyzing the quantitative and qualitative problem of the study, as shown in Figure 7.2.

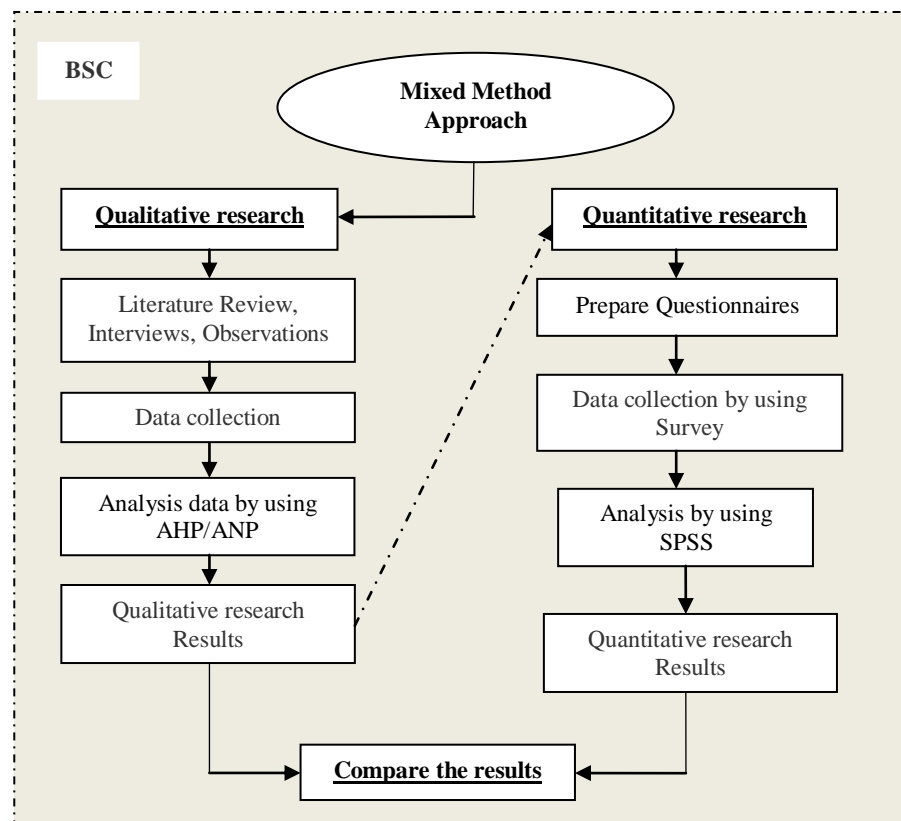


Figure 7.2: Mixed method approach: Adopted research methodology design

In the next sub-sections, the researcher explains the research methodology design adopted in this study.

#### **7.4.1 Balanced Scorecard Approach**

As discussed in Chapter 4, the BSC is a modern management tool based on a clear philosophy in determining the strategic trend of business organizations and measuring progress level of performance in order to fulfill business goals. The BSC is a conceptual approach which translates the strategic goals of a business organization into a set of KPI performance indicators. Some indicators are achieved to measure an organization's progress towards its vision and other indicators are achieved to measure long-term success guides [157]. Thus, the BSC contributes by providing a clear vision for business organizations regarding their current and future status. Many studies adopted the BSC method such as (Sabah [205], Al Sawalqa [3], Kaplan [5], Steward, R.A. [246]), in solving problems similar to this study's. Based on that, the researcher argues that the BSC method is aligned with this study's methodology and provides a methodological approach that could arrange, classify and coordinate study concepts and data in accordance with BSC elements (Goal, objectives, strategies, perspectives, KPIs). Thus, the researcher adopted the BSC method as a methodological basis for all phases of gathering, classifying and analyzing data, in line with its adopted mixed method. The purpose of the mixed method is to adopt the positive points in order to obtain as much detail as possible for the study, and at the same time to overcome the self-characteristics of qualitative studies. Conducting the qualitative research will precede the quantitative one, since the quantitative study employs the results of the qualitative method and improves the tools of the quantitative research, which consequently will answer the questions of the study more objectively [334], as follows:

#### **7.4.2 Qualitative research to identify BSC elements**

Creswell [333] defines qualitative research as a process of inquiry to understand an issue, based on the scientific research method which detects a social or humanitarian problem. The researcher proposes to: build a complex and comprehensive model to analyze the problem and its related issues; prepare a report detailing people's views related to this issue, and then implement the study on community facts of the issue or problem. This method is used to obtain different views and opinions about an issue, or get in-depth information which may be

difficult to express using a quantitative or statistical method. Therefore, the qualitative approach is concerned with views, experiences, and individual feelings and senses, where it offers objective not subjective data. In the qualitative methodology, the situation is realized through a holistic and comprehensive perspective of the issue or problem. Data and information are used to build and develop concepts and theories that help in understanding the issue or problem. In this study, to solve the identified problem, the researcher adopted a case study approach, which is a qualitative research strategy that accurately and comprehensively examines a specific case, or a particular incident, or a set of documents.

The basic idea of the case study approach is to tackle the problem as a case study, (commercial banks in Jordan) in a detailed and precise manner, using all appropriate means. There may be diversity in case study objectives or questions, but the overall goal is to achieve the most comprehensive and thorough understanding of the situation. The method of studying a particular case is intended to give a deep understanding of the case in its natural context, without getting involved in generalizing the results of other cases. This method of qualitative research prevails among sociological and anthropological studies.

#### **7.4.2.1 Methods of gathering information in qualitative research**

The researcher adopted the following methods in order to gather information, based on Creswell qualitative research [332, 335]:

- 1- Literature analysis:** The historical or recent documents are significant sources to explain the nature of the target problem or the issue. Furthermore, the annual reports include the experts' discussions, researches and notes, and writers' and academics' opinions, where analyzing such documents reveals useful information.
- 2- Interviews:** Interviews are one of the major methods of gathering data in qualitative research. It provides notions and feelings about the target group. It also enables restructuring the social, unnoticed incidents. The researcher used the unorganized interview, which is an un-codified method, with open and in-depth questions, where the researcher is more a dialogue manager than an interviewer. This enables the researcher to understand a participant's thinking and behavior without making pre-judgments which could constrain the participant's expression of a viewpoint.
- 3- Notice:** While conducting the interviews, the researcher takes down notes in a natural, free and open method and records them as they occur. The main idea is that the classification and description of information resulting from notes will appear

after gathering and analyzing information, rather than being imposed on information during note-taking.

#### **7.4.2.2 Analyzing qualitative research methodology**

Most problems are produced by multi-effects, such as the problem of this study, and are complex in nature. The researcher adopted the AHP/ANP (see Section 8.3) to analyze data gathered based on the qualitative method. The results of BSC AHP/ANP in analyzing the qualitative method is a subsequent task to building the quantitative method tool (survey) (see Section 8.4). Studies of Yüksel [328], Ravi [336], Thakkar [337], Leung [338], used ANP/AHP based on BSC and were successful in solving problems produced by the impact of several factors.

#### **7.4.3 Quantitative research to analyze the questionnaire**

Quantitative research is one of the most prevalent methods used by researchers, since direct notes used as a method to analyse social problem researches were not sufficient to assist the researcher in answering the increasing queries set by modern circumstances and variables. The quantitative researches are the ones that use figures when analyzing their data and are subject to credibility and consistency terms, and their data are analyzed statistically. Their results can be generalized to the original society, and they rely on field studies to gather data using quantitative measurement tools. The objective of quantitative research is to check the credibility of the phenomenon, study the original society of the sample, study behavior, and examine the problem phenomenon.

##### **7.4.3.1 Methods of gathering information in the quantitative research**

Based on the results of the previous qualitative research (see Section 7.4.2.1), which was built on the basis of BSC-AHP/ANP, the questionnaire was prepared in accordance with the quantitative method, to complement the qualitative approach, in order to facilitate later analysis and comparison of both methods' results.

#### **7.4.3.2 Analyzing quantitative research methodology**

The quantitative researches are related to statistical analyses programmes, where the (SPSS) (see Section 7.9.2) programme is used in analyzing figures and extracting indicators and statistical measures such as mean values, deviations, discrepancies and other factors, in order to address target research questions.

### **7.5 Balanced Scorecard Perspectives**

A dynamic performance measurement tool (BSC) is used by business organizations in an effort to complement their financial performance system. This tool systematically tracks the non-financial performance factors such as customers, internal business processes', learning and growth...etc. Business organizations believe that the non-financial performance seems to influence financial indicators such as market share and profitability [157]. The BSC as a measurement performance model was first presented by Kaplan and Norton in 1992 [157] as a business management concept that transforms both financial and non-financial data into a detailed roadmap that helps business organizations to measure performance and meet both short- and long-term objectives as the researcher mentioned in Chapter 4. It is obvious to follow up the implementation of the phases (see Section 7.3.1) which were established to achieve the sub-objectives and the key objective of this study. This is necessary to make sure the researcher achieves the pre-planned objectives. There are several methods that can be used to do this, but the researcher will use the BSC mentioned in Section 4.7, as the appropriate tool to achieve the purposes of this study. The researcher suggested the use of five major perspectives (see Figure 7.4) as follows [201, 202, 248, 303]:

- **Financial perspective:** This perspective is taken as the final outcome of the activities of the business organization, to achieve satisfaction and expectations of the shareholders by increasing the value of its investments and its profits. The results of this perspective are addressed to achieve the objectives or determine the level of profits derived by a business organization's strategy to work to reduce costs compared to their competitors.

- **Customer's perspective:** This perspective is highly significant since the administration of a business organization seeks to achieve the highest degree of customer satisfaction. This has a great impact on the acquisition of new customers and increases the business organization's ability to retain existing loyal customers and hence maintain its current share of the market. This perspective enables the business organization to view itself from the customers' perspective.
- **Internal business processes' perspective:** This refers to all internal activities and events unique to the business organization. This perspective assesses the degree of success of the business organization and its ability to meet customer requirements. It measures the staffs' skill levels in relation to service provision and productivity; hence, it measures the internal performance of the business organization.
- **Learning and growth perspective:** Reflects the fundamentals that must be adopted by the business organization to create growth and effect the improvements required to achieve the objectives in the long term. This is because failure to achieve long-term objectives can result from the business organization's failure to invest in human resources. Human resources is what helps the business organization to function effectively and efficiently, develop techniques for the production of information support, and change routine procedures so that the business organization can keep pace with modern practices .
- **Internal control perspective:** The focus of this perspective is to achieve the desired objectives of the internal control system, to control money and increase performance efficiency in order to achieve the strategic plans of the business organization. It is necessary to prepare AIS that meet these objectives while taking into account the relevant trade-offs between the acquisition and development of these systems and the desired benefit from them.

As can be seen from the dimension, a BSC can be defined as a management system designed to help the bank to design a performance appraisal system to translate any established strategy into a comprehensive set of KPIs. A BSC does not depend on the achievement of financial objectives only, but also focuses on the non-financial objectives. Therefore, it is concerned with the basic components that may lead to the success of the facility and its work.

### 7.5.1 Elements of the BSC

A BSC provides an adequate work plan for a division, a product, a group of divisions, or a whole business organization. In order for the head of a division to put in place a work plan for a new service or product, s/he needs to plan a BSC to control and manage this plan's performance. The CEOs prepare the basic elements of the BSC for specific purposes as follows [246, 248, 255]:

1. Vision (Goal): specific results that are measurable, achievable and completed within a specific time frame.
2. Strategies: elements used to determine the objective to be achieved through a predetermined value. These are often used in field surveys and referendums and opinion polls.
3. Perspectives: The areas that classify KPIs in business organizations, i.e., in this study KPIs were classified into the following BSC-Perspectives: financial, customers, internal business process, learning and growth, internal control.
4. Key Performance Indicators (measures): the activities to be implemented to achieve the objectives and modify the plan if necessary.

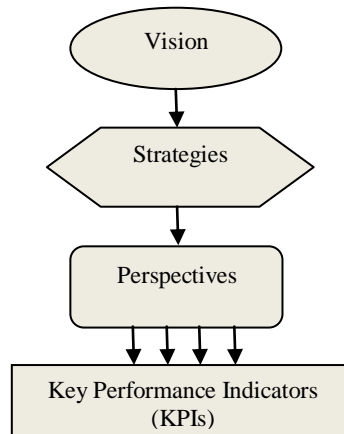


Figure 7.3: Key steps in BSC design

The purpose of using the BSC approach in this study is to ensure that the assessment should reflect a balance between the numbers of elements involved in the performance of AIS. Further, the BSC is not a way to record the results achieved, but rather a way to predict certain outcomes in the future. The next part describes the steps in developing BSC.

### 7.5.2 Steps to develop a BSC to improve the performance of AIS in banks

Kaplan and Norton [201] identified four major steps to build the BSC application as follows:

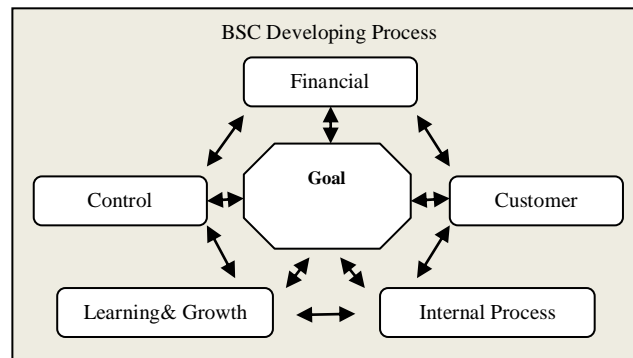


Figure 7.4: Proposed BSC model

**First step: Identifying a BSC model:** What is required in this step is a deeper understanding of the institutional performance so that the BSC becomes a reflection of the strategy by:

- a. Determining the business organization unit which will develop the BSC, its levels, and any potential difficulties.
- b. Determining the business organization unit and its relation to the financial and the general framework of the business organization, in addition to the identification of the relationship between this unit and other business organization units.

**Second Step: Identifying the Strategic Objectives:** In this step, the researcher designed the BSC based on the results of the meetings held with the members of senior management and other teams. This was done by:

- a. Developing an organizational strategy (Vision derived from information and objectives that help the management to translate the strategy and aims into practice while teaching the individuals how to do so.
- b. Getting a response and developing a list of aims, taking into account the strategy of the business organization unit while having a clear understanding of the relation between cause and effect.

**Third Step: Identifying the strategic measures:** Developing the BSC in order to identify the relationships and follow the progress of the achievement of strategies. This is done by:

- a. Developing the KPIs that best relate to the objectives and identifying the sources of information for each internal KPI, in addition to developing relationships that link



the internal KPIs with the different perspectives of the BSC. Moreover, the final outcomes have to be identified along with the stated objectives and KPIs for each perspective and ANP model.

- b. Conducting workshops for the working team responsible for applying the study. This workshop has to deal with the following aspects: the bank's vision, the strategies, the standards and BSC goals of the BSC, and the responsibilities of the individuals working in the bank unit.

**Fourth Step:** Development of the full application of a plan in a very clearly defined method in all departments and sections of the business organization. This is done by:

- a. Establishing a framework and developing a plan for the achievement of the BSC framework. Of course, this needs a link between the database and information systems in addition to ensuring that effective communication occurs in the bank.
- b. Interviewing the members of the senior management team to obtain their approval for goals, objectives and KPIs. Meanwhile, there is a need to ensure that the operational objectives match the philosophy of management. Already, management has to agree on information systems that support these actions.
- c. The BSC has to be integrated and be in line with the system of the business organization as long as this is possible. Moreover, there should be an emphasis on the philosophy of the business organization as well as the information that best suits the users. The following figure illustrates the proposed BSC model for this study.

### 7.5.3 Identifying and developing a work plan

Here, the researcher discusses the steps taken to assess the success of using BSC by formulating the BSC strategic objectives and setting up a plan as follows [339].

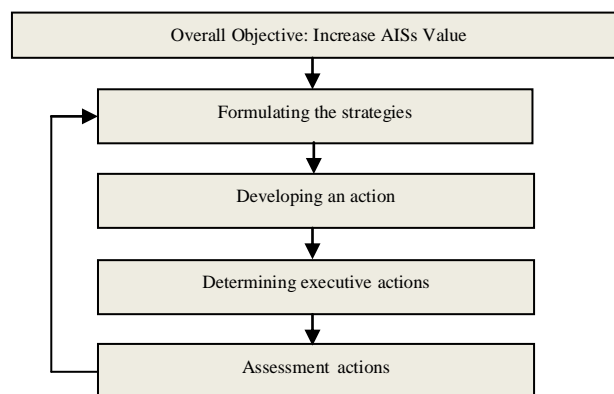


Figure 7.5: Developing a work plan

- 1. Formulating the strategic objectives:** The formulation of strategic BSC objectives is in line with the general strategic plan and those of the BSC itself. This formulation was done in preparation for final approval by the senior management of the banks. Three strategic objectives were derived that related to the general objective of this study as in Figure 7.6 follows:

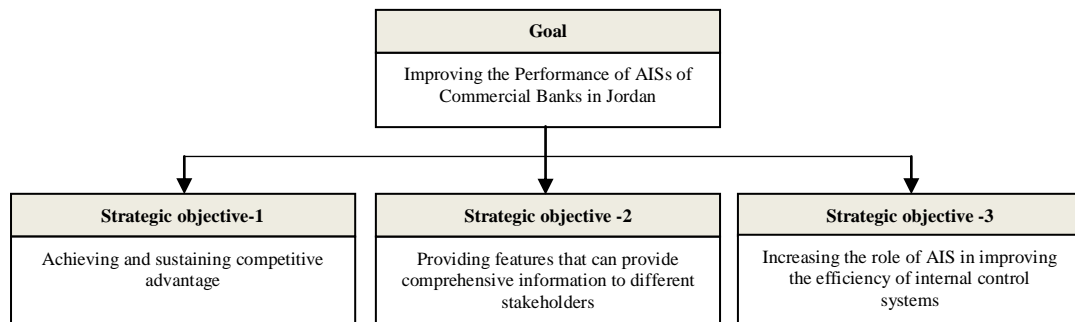


Figure 7.6: Study goal and strategic objectives

All of the identified objectives of this strategy will be discussed in Chapter 8, upon applying the methodology of the study in practice.

- 2. Developing an action:** It was intended to put each phase of the work in its appropriate framework. Here, the framework should include a plan for the work of individuals and according to certain requirements and priorities. A timetable for the work of the various factors was established, paying more attention to the preparation of interim and final reports during work progress.
- 3. Determining executive actions:** This requires a statement of activities and actions which will be applied soon to achieve the objectives and put the plan into practice. Separately, this requires depending on specific objectives and defining certain responsibilities in the presence of effective tools to achieve the objectives with appreciation to the time factor. What also shall be taken into consideration is the influence of executing the actions on both the workers and the senior leaders in banks. These factors were considered and adopted during the implementation of this study to ensure the achievement of its overall objectives.

4. **Assessment actions:** This is intended to test the actions for verification; subsequently, they are either accepted or reformulated. This requires returning to the same procedures until the actions that lead to increasing AISs' value are accepted.

## **7.6 Levels needed to improve the performance of AIS**

In order to establish a strategy to improve performance, AIS needs three levels: Namely the macro or holistic, public administrations, and service-level. In addition, the adoption of strategic planning for AIS illustrates a general trend of the business banks in Jordan towards applying it in all departments and branches. This trend should be highlighted and looked at closely in the strategic planning for AIS at the lower levels. The strategic planning of the AIS should ensure success in achieving and developing the following areas:

### **Level 1:** Macro or holistic area:

1. The quality of the service provided by AIS in commercial banks.
2. The increase in productivity and the diversity of activities.
3. Activating the role of internal systems in banks.

### **Level 2:** Public administrations area:

1. Directing the media to serve the AIS strategy.
2. Establishing cooperation with all stakeholders to improve the performance of the AIS strategy.

### **Level 3:** Service area

1. Providing any necessary support for the various activities.
2. Developing the human resources in the various aspects of work as well as establishing a collaborative work environment.
3. Adopting mechanisms and methods to appropriately and effectively measure performance.

## **7.7 Establishing a BSC by using Analytical Hierarchy Process and Analytic Network Process to improve the performance of AIS**

The decision-making process of solving a critical problem requires assessment of multiple KPIs at the same time. It also requires making a choice among alternatives. In other words, these KPIs are the factors that need to be achieved and measure their efficiency in achieving a certain objective. In general, any complicated decision-making process may include tangible KPIs (quantity) or non-tangible KPIs (quality) or financial and non-financial KPIs. Therefore, the researcher needs to find a methodology for decision-making that combines the personal preference KPIs as well as the objectivity in the analysis of the problem [340, 341]. It is noted that many recent studies [248, 277, 328, 336, 338, 342-345] have combined the BSC and the AHP/ANP methodologies. In other words, the AHP/ANP approach addresses the shortcomings of the traditional approach of BSC which omitted to consider the logical relationships among the priorities on the use of the different perspectives and KPIs. Moreover, it does not accurately discover the relationships and present these quantitatively as percentages in order to successfully assess business organization performance [338, 344, 345]. Furthermore, Lee et al. [345] concluded that the traditional BSC approach failed to find a unified methodology to assess the different performance indicators. Therefore, they introduced AHP/ANP as a multiple assessment technique that addressed the inadequacies of the traditional BSC approach. Consequently, this approach of combining BSC with AHP/ANP can eliminate any fuzziness or vagueness [340]. Throughout the following sections, the AHP/ANP approach will be explained in detail. The following detailed discussion explains how this technique works and how it can be applied in relation to the BSC approach.

### **7.7.1 AHP/ANP as an integrated approach**

AHP/ANP is a technique for a series of construction designed to assist staff with complex decisions. Rather than taking previous correct decisions to help them make the better decision, this process depends on psychology and mathematics in its application. AHP has achieved great success and adoption in recent years, producing positive results in many areas of management, accounting, health and education....etc., and providing a complete logical framework for the elements of the case under discussion and evaluation. It then forwards those elements to the goals to deal with them and provide related alternative solutions. AHP analyzes the issue or the problem at hand in the form of a hierarchy, starting from the top of the pyramid (Goal) and ending at base (KPIs). ANP is a more general form of AHP that deals with the elements of the case or problem as a network of cause and result relationships. The ANP allows the measurement of the internal relations between the elements of the case or problem, and its results can be integrated with the previous results of the AHP. Both are used to make a comparison between the elements of the case or problem, giving weights to the importance of the available decision-making alternatives.

The AHP/ANP is considered one of the most importance techniques in the multiple decision-making KPIs. In 1970, this approach was developed by Saaty [346], a professor of mathematics at Pittsburgh University, USA. This theory was published for the first time in 1980 [347, 348]. The theory states that it is possible to choose among several alternatives (choices), taking into account the factors and principles upon which the selection process takes place. For example, non-digital data can be easily measured. This is because this approach does not depend on bilateral comparisons of numbers and includes no absolute values. The AHP/ANP process simply depends on the relationship between the KPIs and the alternatives for each criterion [347, 349]. This process of ranking or comparisons involves making use of the experience of the decision-making committee members in any organization, even if there is some conflict among their opinions in all administrative levels [350, 351]. Possibly, the reason for the popularity of this technical approach is its simplicity and ease of application [352]. Saaty, Lee et al., [346] cited examples of governmental and commercial applications that widely applied this approach in all its levels of technology. For instance, British Airways in the late nineties used this approach to test the upgrade system of its entire fleet of aircraft to discover the ability of the system to cope with the requirements of the new century [346]. Another example is the use of this approach by the management of ABN AMRO Bank in its decision-making

process. Moreover, it is possible to apply the AHP/ANP in when business organizations need a decision-making process that necessitates making a choice from a range of alternatives. This approach can also be used for assessment purposes and to predict future results [328, 346]. In the next sub-section, the researcher discusses the AHP/ANP as two multi-criteria decision methods (MCDM),

### **7.7.2 AHP/ANP: Multiple-Criteria Decision-Making**

The most significant characteristic of the AHP/ANP is its focus on the way that human minds organize information needed for decision-making. The AHP/ANP helps decision-makers to see the continuous interaction among the various components in complex and non-structured situations. This method helps to define and prioritize the elements of a problem according to the desired objectives, as well as using the existent knowledge and experience of individuals. The development of the AHP/ANP was based on the theory of decision-making by Multiple Criteria Decision Making (MCDM) [353]. These observations on the basic nature of human thought, analysis, and measurement led to the emergence of a new technique of hierarchical analysis as a useful model to solve quantity-related problems. In addition, this model proved to be a flexible model that enables individuals or groups to form ideas. This model also helps in identifying the problems through the development of personal assumptions, as well as the extraction of appropriate solutions. Furthermore, this model enables individuals to choose the accuracy of the resulting solution in case any changes are introduced [354]. The AHP/ANP combines fuzzy scales with personal values in a logical manner based on imagination, experience and knowledge, to build an approach to solve the complex problems. The AHP/ANP model depends on logic, intuition and experience to give decisions. Once this model is applied, it shows how the elements are linked to produce a successful result. AHP/ANP is also an approach that identifies the various internal relationships of a system [340]. To define a complicated problem and obtain satisfactory decisions, one must repeat the AHP/ANP process several times. It is very difficult to find an immediate solution for complicated problems which caused long-term angst. Meanwhile, the AHP/ANP model is flexible enough to enable decision-makers to review and expand the elements of a certain problem and change their judgments, if needed. By using the AHP/ANP model, decision-makers can also verify the accuracy of output for any unexpected changes. Every time this process is repeated, the process becomes similar to that of testing a problem of the study objectives, exactly imitating what is done in all scientific fields. A better understanding of the AHP/ANP system can be reached through

either progressive refinements of the hypotheses, or practical applications of the approach. In addition, these models can be used with other problems with minimal modifications [354]. Another feature of the AHP/ANP model is that it allows collective participation in decision-making or in problem-solving. The decisions made are often subjected to accountability i.e., they can be accepted or rejected in accordance with the feedback provided by others [346, 355, 356]. Dealing with any problem using the AHP/ANP model requires special attention to be paid to the ideas, opinions and facts provided by others. It is necessary to take this feedback into consideration as a significant element of the problem. This method was adopted when considering the methodology to adopt for this study. Collective participation not only adds to the credibility of the final outcomes, but also contributes to the ease of application, when different views exist. Therefore, it is possible to include in the analysis process, the data that is self-evident or derived scientifically [355].

Based on the previous argument, the researcher concluded that the AHP/ANP technique can be applied to real problems such as the problem of the present study. This is considered very useful for the distribution of resources, planning, policy analysis, and conflict resolution. This approach can be used by social scientists, engineers, politicians, but also ordinary people without the help of any experts [346]. Those who have a problem are the best to know its tiny details. That is why, at present, the AHP/ANP approach is commonly used in planning for large businesses, huge business organizations, and big banks. It is used to test the financial portfolios, as well as in the analysis of cost and benefit by governmental organizations, for the purpose of distributing the resources of an investment [340, 357].

### **7.7.3 AHP Method to solving complex problems**

AHP contributes to solving complex problems through a hierarchy of KPIs applied and the related parties and outputs. AHP also leads to the prediction of results by comparing the costs, and exercising control over the assessment of how accurate were the results and the extent to which they cope with the changes in fuzzy scales. Finally, AHP leads to future planning and provides a foundation for the achievement of the desired future outcomes. The AHP provides the framework necessary to solve many problems; this method enables us to make effective decisions in complicated situations as it simplifies the process and makes the natural decision-making process smarter. The AHP basically divides any complex situation into its basic parts. It then organizes these parts or variables sequentially, using numerical

values to indicate the relative importance of each variable separately, and finally certain fuzzy scales are made in order to decide the priority of variables. The AHP also provides decision-makers with a scientific, effective structure that imposes a system on the rational thinking process on those decision-makers. Here, there is a need to identify a numeric value for each element of the problem to help the decision-makers maintain a harmonized intelligent model that may help them to reach the required results. At the same time, this enhances the credibility of the AHP as a tool of decision-making [328, 351, 352, 354, 358]. Further to the previous points, any details of the processes that lead to the decision-making process must be easy to review and subject to reconsideration. The AHP reflects the usual innate way of acting and thinking. Moreover, AHP deals with the complicated problems according to the interactions involved in each. This approach allows individuals to classify the problem as they look at it in terms of complexity. It also enables them to define its phases and identify its components. As far as complicated problems are concerned, the determination of its composition and area of conflict to resolve it, using the AHP model requires information and relative importance from several participants in the process. At the end, decisions made by the various participants are transformed into a comprehensive assessment of the relative importance of decision alternatives, through some mathematical sequences. relative importance resulting from the AHP represent the basic milestones used in all types of analyses [328]. For instance, these basics can be used as indicators to distribute the resources or at least can be used as possible predictions, or these can further be used to assess the cost of something. For example, the researcher has used AHP to predict something about the economy of a certain country [351, 357, 359].

#### **7.7.3.1 The purpose of using AHP technique to improve AIS performance**

The purpose of using the AHP approach is to achieve the various objectives of this study, as it possesses many characteristics that will enable the following objectives to be achieved [277, 328, 347, 351, 354, 356]:

- a. It combines the macro and micro approaches in a convincing manner. The macro level is performed through developing the hierarchy, i.e. looking at all elements as a whole. Conversely, the micro approach is concerned with a thorough examination of the various parts by comparing them bilaterally.
- b. It covers both the quantitative and qualitative aspects. Aspects of quality are related to the definition of the problem, setting the objectives and the criteria (KPIs). On the



other hand, the quantitative aspects are expressed in terms of relative importance and local weights.

- c. It covers both fields of science and art together. AHP covers the scientific side in that it presents a sort of control over the reliability test. It also covers art as it encourages innovation and creativity.
- d. It Combines theory and subjectivity; it is a theoretical approach as it is based on theoretical methods such as, relative importance, matrices and extraction weights. It is also subjective as it is subjected to the interests and preferences of the decision-makers when making comparisons. Therefore, decisions will be different depending on the personal preferences of individuals. Simultaneously, these personal preferences will be subjective when it comes to making deeper decisions. At the end, one has to consult other experts and professionals in the decision-making process.
- e. This approach is able to assess tangible and intangible characteristics through bilateral comparisons and based on the ability of the human mind to distinguish these qualities, regardless of whether they are tangible or intangible.
- f. This approach is able to interact well with both simple and more complicated problems.
- g. This approach can be easily formulated, and has proved to be very flexible and subject to review and diversity.

### **7.7.3.2 The purpose of using ANP technique to improve AIS performance**

The researcher has deliberately used the ANP approach in the methodology of this dissertation. The following points illustrate the most significant benefits of this approach [328, 340, 345, 347, 358]:

1. ANP is a practical way to deal quantitatively with the various types of functional relationships in a complex web.
2. It is a powerful tool to integrate the expected planning with the required planning in a dynamic way that reflects the decisions made by all individuals involved. The outcomes of this process are clear rules for the allocation of resources in light of the current proposed strategies as well as the new ones. These may also be used to satisfy certain organizational objectives.

3. ANP is a new approach to:
  - a. Merge the data with the clear conventions of intangible factors.
  - b. Blend several fuzzy scales of individuals in a way to resolve any dispute.
  - c. Analyze accurately and audit at low cost.
  - d. Use the marginal and medium fuzzy scales to rationalize the allocation.
  - e. Strengthen management to clearly make concessions.
4. ANP is tool that complements other tools (benefit, cost, values, and reduction of risk) in the selection of projects or activities.
5. It is an alternative for a range of methods used to predict the future to protect the business organization from risk in case of uncertainty.
6. ANP manages and organizes the achievement towards a number of vital objectives.

## **7.8 Building a Hierarchical BSC Model for improving performance of AIS in Banks**

There are no fixed rules for building a hierarchical BSC model, since the process of developing it depends on the type of decision to be made. If the type of decision involves choosing from among alternatives, then one can start from the last level, while simultaneously putting the available alternatives on the list. In such schemes, the next level includes the KPIs by which the decisions of choosing an alternative will be decided. Finally, the highest level will consist of only one element that represents the comprehensive purpose for which the decision will be made and in accordance with the existing KPIs and the contribution of each. The fundamental principle followed to develop the hierarchical model is the ability to answer the following question [328, 345, 347, 354]:

*Is it possible to compare elements from a lower level with some or all the items appearing in the next higher level?*

The followings are some suggestions for building a hierarchical BSC model:

- a. Determining the goal (vision); i.e. what shall be achieved?
- b. Determining the strategies to be pursued so as to achieve the business organization's vision. If needed, it is possible to set a timeline, studying the time factor and its impact.

- c. Determining the BSC-perspectives and the KPIs based on these perspectives.
- d. Determining the correlations between BSC elements (goal, strategies, perspectives and KPIs). That can be achieved by using AHP/ANP approach.
- e. Determining the BSC model hierarchically. The BSC hierarchical model established by the vision, strategies, BSC-perspectives and KPIs determined in the previous steps is shown in Figure 7.7.

Finally, it should be noted that the most successful way to building a hierarchical BSC model is by researching the topic in the presence of the people concerned. Subsequently, a list representing all elements and alternatives should be put. After this, participants will collect these items and alternatives to arrange them in a hierarchy BSC modal.

### 7.8.1 Setting the BSC-AHP model

According to the BSC approach which was discussed earlier, the researcher established a BSC-AHP model for this study, as shown in Figure 7.7. The proposed construction of the previous model was based on the BSC methodology and according to the AHP approach, which was used in the previous literature [328], interviews, and consultations with specialists from the departments of commercial banks in Jordan and specialists from academics in the universities (see sub-section 7.3.2.1). Further, the researcher has adapted the model to suit the environment in Jordan. It was intended that the purpose is to achieve the goal of this study. The model was developed through four main levels as follows:

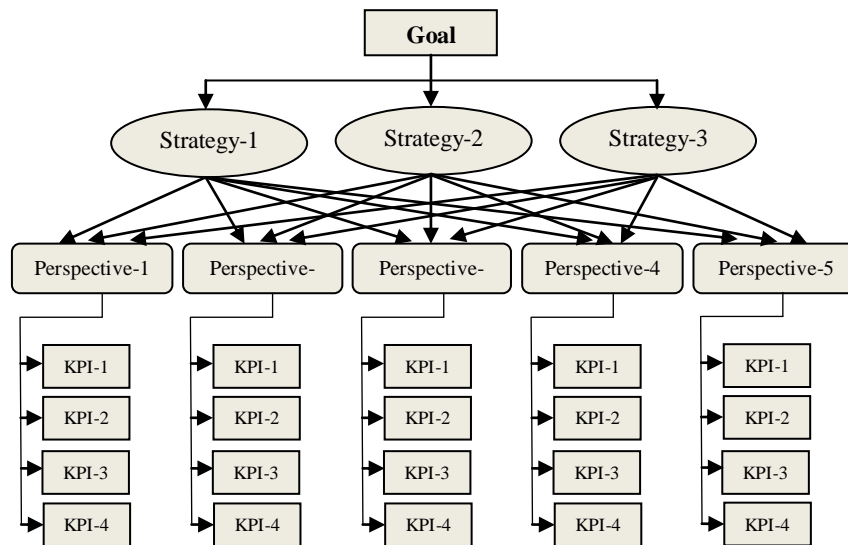


Figure 7.7: Setting the BSC-AHP model

The hierarchical BSC-model model comprises four levels: first level includes the business organization goal; second level has the strategies developed to achieve this goal; third level contains BSC-perspectives and; fourth level, the KPIs. In this and the following chapter, the researcher addresses each level separately in detail.

### **7.8.2 Determine the fuzzy scales for AHP model**

The AHP is done by taking the relative importance among the BSC hierarchical elements and collecting the relative importance to obtain a set of overall fuzzy scales. Further, the stability of these fuzzy scales is checked to make a final decision based on the results of this process. Saaty and Michael [355] pointed out that systems can always analyse complex relationships by taking pairwise of elements and linking them together through qualities' characteristics. This approach to understand the complex causal relationships is complemented by systems' approach through partial systems or dimensions of parts which are interrelated. The AHP that uses both approaches simultaneously, uses reflection systems to build ideas hierarchically and uses reflection or causal interpretation through bilateral comparison for the elements and assembly [328]. The researcher adopted these two methods as a basis of relations between the elements of the BSC-AHP. The fuzzy scales are applied to conduct dual comparisons, blend logical thinking with emotions generated by experience. The mathematical sequence described in this chapter, is more sufficient than normally used to reach a solution. The final result is not necessarily correct, if the solution resulting from AHP analysis does not seem appropriate for an experienced and knowledgeable decision-maker. The solution will be better when repeated and the AHP is re-built, or the fuzzy scales are re-examined. On the other hand, the AHP analysis tests the stability of fuzzy scales. Experience reveals that the results of the AHP analysis method converge with the reached decisions in the business organization world. Referring to Figure 7.7, the comparison mechanism can be pointed out according to previous steps as follows:

**Step 1:** Construct pairwise comparison matrix of objectives with respect to the goal.

The first step in determining the relative importance of the elements during problem resolution is to make bilateral comparisons, i.e. comparisons between pairwise of elements for a specific attribute. The matrix is the favourable formula for pairwise comparisons, since it is a simple and common tool known to provide a framework to test stability. Also, additional information is obtained by conducting all possible comparisons, and sensitivity

analysis for the overall fuzzy scales of changes in the decision [328, 346, 354, 357, 360]. For example, pairwise comparison start from the top of the hierarchy by selecting the criterion or attribute "X", which will be used to make the first comparison, then the elements come at the next level of the hierarchy (A1, A2, A3, ... .. An), and so on. These elements are then arranged in a matrix as shown in Table 7.1.

Table 7.1: Pairwise comparison matrix of objectives

X	A1	A2	A3
A1	1, 1, 1	½, 1, 3/2	1, 3/2, 2
A2	2/3, 1, 2	1, 1, 1	5/2, 3, 7/2
A3	½, 2/3, 1	2/7, 1/3, 2/5	1, 1, 1

In this matrix, the element (A1) in the left column is compared with the elements (A1, A2, A3, ... etc.) in the first row from the top, that is answered in each pairwise comparisons. Then the process is repeated with the element A2 and so on. The question is: How much does this element have of (A1) that is important to achieve the goal (strategy (X))? The wording of the question is significant, since the question should reflect the proper relationship between the elements in one level, with the attribute in the level directly above. The methodology of this study required comparisons as discussed earlier, for all elements under the hierarchy (Figure 7.7). Here comparisons are made between the attribute and the required elements, where all attributes to be detected are summed with the elements achieved. To fill the matrix pairwise comparisons, numbers are used to represent the relative importance of one element to the other element with regard to the comparable attribute. The fuzzy scale regarding relative importance to measure the relative weights is given in Figure 7.8 and Table 7.2 contains the basic scale that will be used for pairwise comparison of fuzzy AHP method.

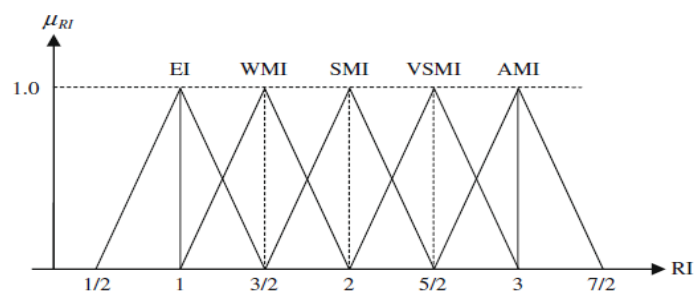


Figure 7.8: fuzzy scale for relative importance [361]

Table 7.2: Basic fuzzy scale of pairwise comparisons [328]

Linguistic fuzzy scale for importance	Triangular fuzzy scale	Triangular fuzzy reciprocal scale
Just equal	1, 1, 1	1, 1, 1
Equally important (EI)	$\frac{1}{2}$ , 1, $\frac{3}{2}$	$\frac{2}{3}$ , 1, 2
Weakly more important (WMI)	1, $\frac{3}{2}$ , 2	$\frac{1}{2}$ , $\frac{2}{3}$ , 1
Strongly more important (SMI)	$\frac{3}{2}$ , 2, $\frac{5}{2}$	$\frac{2}{5}$ , $\frac{1}{2}$ , $\frac{2}{3}$
Very strongly more important (VSMI)	2, $\frac{5}{2}$ , 3	$\frac{1}{3}$ , $\frac{2}{5}$ , $\frac{1}{2}$
Absolutely more important (AMI)	$\frac{5}{2}$ , 3, $\frac{7}{2}$	$\frac{2}{7}$ , $\frac{1}{3}$ , $\frac{2}{5}$

This fuzzy scale identifies the values and interprets them according to the linguistic levels of importance given to the scales in the pairwise comparison of the identical elements at every level of the hierarchy, to the directly upper level attribute. Yüksel [328] confirmed that a scale of six points is reasonable and reflects the degree of distinguish the extent of relation between the elements. It is recommended, upon using this scale in social, psychological or political fields to express importance by words first [328, 345], and then translate them into numerical values (relative importance). The numerically interpreted scales are approximate, and their credibility can be assessed through testing stability and realistic applications, where the researcher will use questionnaire, which will be discussed later in Section 7.5.2.2. Upon comparing an element in a matrix by itself - for example A1 with A1 in the Table 7.1, the result of the comparison ought to be 1. Therefore, the matrix can be filled with the numbers 1,1,1. The first element of the left side of the matrix is always compared with the second element in the top row. Then the numerical value of the comparison is estimated from the scale given in Table 7.2. Then the inverse value is used for the inverse comparison of elements. Moreover, sense is not integrated in the process. To be more precise, the exact pairwise comparison matrix and the given scale, provide a more convincing framework. The issue becomes more complicated when the situation requires a comparison between several attributes or standards, where it is difficult to give random numbers. Rather, the figures must be chosen accurately to express the power of each element, or its contribution to the subject attribute of comparison. Such accuracy guarantees that at the end, the overall relative importance of elements will be obtained, since it takes into account all the alternatives. This relative importance can also be used for the distribution of resources. To simplify the concepts and fuzzy scale contained in Table 7.2 above, the researcher explains it through Table 7.3:

Table 7.3: The Interpretation of basic fuzzy scale of pairwise comparisons [328]

Linguistic fuzzy scale for importance	Explanation of the importance level
Just equal	Elements contribute the same amount of the goal (two activities are equal in importance to the object).
Equally important (EI)	Very similar to the elements or importance of centrist. Sometimes an individual needs to be given numerically compromise verdict where there are no words describe
Weakly more important (WMI)	experience and appreciation of the element of favour over the other slightly
Strongly more important (SMI)	Experience and appreciation strongly prefer active over the other
Very strongly more important (VSMI)	Element is preferred to the other very much, its importance illustrated by the practice
Absolutely more important (AMI)	Directory on the preference of the last element represents the highest degree Possible emphasis

**Step 2:** Determine the local weights of the objectives or strategies.

To determine the local weights of the objectives or strategies for a set of pairwise comparisons, resulting scales must be added together; i.e., some outweigh and addition should be made, to obtain one figure that represents the priority for each element. The following example shows how to derive relative importance from the fuzzy scales. Returning to the objectives (strategies) that have been developed to achieve the purpose of this study, these represent the three alternatives which the researcher intends to reach, i.e., a matrix. An attribute is placed (the main purpose or goal) in the left corner of the matrix, and the objectives (strategies) are put in the left column and top row of the matrix in Table 7.4.

Table 7.4: A simple matrix to compare the objectives

Attribute/ Goal	Objective-1	Objective-2	Objective-3	Weights
Objective-1	1, 1, 1	3/2, 2, 5/2	2/3, 1, 2	0.429
Objective-2	2/5, 1/2, 2/3	1, 1, 1	3/2, 2, 5/2	0.360
Objective-3	1/2, 1, 3/2	2/5, 1/2, 2/3	1, 1, 1	0.211

This matrix contains nine cells to be filled. The cells located on the diagonal matrix are filled with the number 1, 1, 1 as shown in Table 7.4. The three cells at the top of the diagonal are left to be filled. The scales below the diagonal are filled with the inverted given scales in the cells above the diagonal (notice that the invert of 3/2, 2, 5/2 equals 2/5, 1/2, 2/3). What is the extent of linguistic scale for importance between objective 1 in terms of achieving all the goals of objective-1 and objective-2? Based on personal experience and preference, it can be said that the most suitable extent of significance when comparing objective-1 with objective-2 is (Strongly More important (SMI)), and (Equally important (EI)) when comparing

objective-1 with objective-3... and so on for the rest of the objectives. Therefore, the value becomes  $3/2$ ,  $2$ ,  $5/2$  when comparing objective-1 with objective-2 and  $2/3$ ,  $1$ ,  $2$  when comparing objective-1 with objective-3. When comparing the invert, for example objective-2 with objective-1, the figures are the invert of scales placed in the first row when comparing objective-1 with objective-2... and so on for the rest of the scales, as shown in Table 7.4.

**Step 3:** Compute the interdependent relative importance weights.

The next process is to formulate the fuzzy sets scales for a rough estimate of the relative importance weights of these objectives (strategies) for the major attribute or goal. This can be achieved as follows:

Among the various shapes of fuzzy number, Triangular Fuzzy Number (TFN) is the most popular one. Therefore, a Triangular Fuzzy Number based Analytic Hierarchy Process (TFN-based AHP) model is applied [362]. Now, Consider  $X = \{x_1, x_2, \dots, x_n\}$  to be an object set and  $U = \{u_1, u_2, \dots, u_n\}$  to be an objective set. According to Chang's approach, object analysis has to be carried out for each of the possible objectives, i.e., let

$$M_{\text{objective } i}^1, M_{\text{objective } i}^2, \dots, M_{\text{objective } i}^m, \quad i = 1, 2, \dots, n$$

where  $M_{\text{objective } i}^j$  are TFNs for all  $j = 1, 2, \dots, m$ .

The steps of this approach can be implemented as follows:

Sub-step 1: Let  $\tilde{M}_1 = (l_1, m_1, u_1)$  and  $\tilde{M}_2 = (l_2, m_2, u_2)$  be two triangular fuzzy numbers such that  $l_i, m_i$ , and  $u_i$  ( $i = 1, 2$ ) denote the smallest possible value, the most promising value, and the largest possible value that describe a fuzzy event. The researcher defines the degree of possibility of  $\tilde{M}_2 \geq \tilde{M}_1$  as



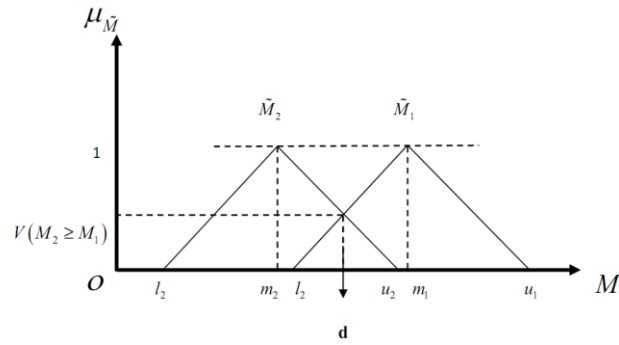


Figure 7.9: The degree of possibility of  $\tilde{M}_2 \geq \tilde{M}_1$

Equivalently, the possibility function can be written as

$$V(\tilde{M}_2 \geq \tilde{M}_1) = \begin{cases} 1, & \text{if } m_2 \geq m_1 \\ 0, & \text{if } l_1 \geq u_2 \\ \frac{l_1 - u_2}{(m_2 - u_2)(m_1 - l_1)}, & \text{otherwise.} \end{cases}$$

Where  $d$  is the abscissa value corresponding to the highest intersection point between  $\tilde{M}_1$  and  $\tilde{M}_2$ .

Sub-step 2: Perform the addition operation of  $m$  extent analysis values such that

$$\sum_{j=1}^m M_{\text{objective } i}^j = \left( \sum_{j=1}^m l_j, \sum_{j=1}^m m_j, \sum_{j=1}^m u_j \right), \quad (1)$$

and

$$\sum_{i=1}^n \sum_{j=1}^m M_{\text{objective } i}^j = \left( \sum_{i=1}^n l_i, \sum_{i=1}^n m_i, \sum_{i=1}^n u_i \right). \quad (2)$$

By applying this step to the previous objectives in Table 7.4, the researcher obtains the following Table 7.5:

Table 7.5: Objectives triangular fuzzy number “assembly matrix”

Attribute/ Goal	$l$	$\sum_{j=1}^3 l_j$	$m$	$\sum_{j=1}^3 M_j$	$u$	$\sum_{j=1}^3 u_j$
Objective 1	1, 3/2, 2/3	3.17	1, 2, 1	4	1, 5/2, 2	5.5
Objective 2	2/5, 1, 3/2	2.9	1/2, 1, 2	3.5	2/3, 1, 5/2	4.17
Objective 3	1/2, 2/5, 1	1.9	1, 1/2, 1	2.5	3/2, 2/3, 1	3.17
<b>Sum</b>		<b>7.79</b>		<b>10</b>		<b>12.84</b>

$$\sum_{i=1}^3 \sum_{j=1}^3 M_{\text{objective } i}^j = \left( \sum_{i=1}^3 l_i, \sum_{i=1}^3 m_i, \sum_{i=1}^3 u_i \right)$$

$$\sum_{i=1}^3 \sum_{j=1}^3 M_{\text{objective } i}^j = (7.79, 10, 12.84)$$

Sub-step 3: Calculate the inverse of the three dimensional vector in Step 2, as follows:

$$\left( \sum_{i=1}^n \sum_{j=1}^m M_{\text{objective } i}^j \right)^{-1} = \left( \frac{1}{\sum_{i=1}^n u_i}, \frac{1}{\sum_{i=1}^n m_i}, \frac{1}{\sum_{i=1}^n l_i} \right)$$

Hence,

$$\left( \sum_{i=1}^n \sum_{j=1}^m M_{\text{objective } i}^j \right)^{-1} = (1.28, 0.1, 0.08)$$

Sub-step 4: Then the total dimension value  $l$  is alternated with the dimension  $u$  as shown in Table 7.5, leaving the same value of the dimension  $m$ , and the resulting value of alternation is multiplied by the total dimension value of each objective separately, where the output appears as shown in Table 7.6:

Table 7.6: Total objectives triangular fuzzy number

Attribute/ Goal	$l$	$m$	$u$
Objective-1	0.25	0.4	0.69
Objective-2	0.23	0.35	0.52
Objective-3	0.15	0.25	0.396

Sub-step 5: Conduct a comparison with each of the other objectives, which will enable meaningful comparisons to be conducted between the elements, as in Tables 7.7-7.9 which shows a comparison of objective-2 which was compared to objective-1 and objective-3.

Table 7.7: Comparison objective-1 with objective-2 and objective-3, based on Triangular fuzzy number

Compare objectives	$l_2$	$m_2$	$u_2$	vs	$l_1$	$m_1$	$u_1$	Result
Objective-1 and objective-2	0.25	0.40	0.69	vs	0.23	0.35	0.52	<b>1</b>
Objective-1 and objective-3	0.25	0.40	0.69	vs	0.15	0.25	0.39	<b>1</b>

Table 7.8: Comparison objective-2 with objective-1 and objective-3, based on Triangular fuzzy number

Compare objectives	$l_2$	$m_2$	$u_2$	vs	$l_1$	$m_1$	$u_1$	Result
Objective-2 and objective-1	0.23	0.35	0.52	vs	0.25	0.40	0.69	<b>0.84</b>
Objective-2 and objective-3	0.23	0.35	0.52	vs	0.15	0.25	0.396	<b>1</b>

Table 7.9: Comparison objective-3 with objective-1 and objective-2, based on Triangular fuzzy number

Compare objectives	$l_2$	$m_2$	$u_2$	vs	$l_1$	$m_1$	$u_1$	Result
Objective-3 and objective-1	0.15	0.25	0.39	vs	0.25	0.40	0.69	<b>0.48</b>
Objective-3 and objective-2	0.15	0.25	0.39	vs	0.23	0.35	0.52	<b>0.61</b>

The position of the objective to be compared is placed on the left with the objective to be compared with on the right as shown in Tables 7.7-7.9. Aspects of the objective to be compared are given the number 2, such as  $l_2, m_2, u_2$  and the aspects of the objective to be

compared is given the number  $l$ , such as  $l_1, m_1, u_1$ . In order to complete the comparison process, the researcher applies one of the equivalently expressed comparisons, which was prepared for this purpose, based on the situation under comparison. Results of the equivalently expressed comparison are not supposed to deviate from one of the following results, which must be tested to select the most appropriate case according to sequence, starting from the first case as follows [328]:

Table 7.10: Cases of equivalently expressed, based on  
Triangular fuzzy number

Cases	Expressed results	Equivalently Expressed
first case	if $m_2 \geq m_1$	1
second case	if $l_1 \geq u_2$	0
third case	Otherwise	$\frac{l_1 - u_2}{(m_2 - u_2)(m_1 - l_1)}$

Sub-step 6: A percentage is selected for each compared element, at least among all the compared results of an element, as per the previous paragraph's example. These percentages related to a goal or objective to be detected are grouped together as shown in Table 7.11.

Table 7.11: Shows how results of comparison and weights of the previous three objectives were extracted.

Compare objectives	Min	Min objective (n)/ $\sum$ min	Weights
<b>Objective-1 with (Objectives 2 and 3)</b>	1	1/ 2.333	0.429
<b>Objective-2 with (Objectives 1 and 3)</b>	0.84	0.84/2.333	0.360
<b>Objective-3 with (Objectives 1 and 2)</b>	0.493	0.493/ 2.333	0.211
	2.333		1

To choose the best alternative from the results of the comparison, the alternative achieving the lowest rate is chosen, for each item separately. In the previous example, 1%, 0.84% and 0.493% are chosen; these are the ratios obtained by comparing the previous objectives with each other (Table 7.11).

*Sub-step 7:* This step is required in order to obtain the weights (percentages that represent the amount of the impact of one element among the compared elements for the same goal or objective). Each final result of a given element is divided by the total of those elements as shown in Table 7.11. The former procedures were used to obtain the weight of each element in achieving the overall goal. Results revealed that the element objective-1 achieves a rate of 0.429%, when compared with each of (objective-2, objective-3); (objective-2) achieves a rate of 0.36%, when compared with each of (objective-1, objective-3); and the item (objective-3) achieves a rate of 0.211, when compared with each of the items (objective-1, objective-2). The same procedure is used in the same way for all the elements that this study needs.

The previous steps are examples of the method to be adopted to extract local weights only. In Section 8.2, this method of extracting global weights will be discussed, and related procedures of extracting these weights are explained.

### **7.8.3 Validity and reliability of the AHP/ANP approach**

#### **7.8.3.1 Validity of statements for AHP/ANP approach**

The AHP/ANP approach is distinguished by the fact that it has a solid mathematical basis, and that there are several experiments conducted by Forman [352], Yüksel [328], Lee [345], especially in banking as in Wu's [277] study. Since the fuzzy scales stemming from the pairwise comparisons are of a personal, human nature, comparisons may not be compatible [340]. This feature is unique in that it is possible to calculate any amount of inconsistency for each set of fuzzy scales. This feature enables decision-makers to identify mistakes and review the scales, and in case of access of high value that indicates conflict, therefore, improve decision quality. There are direct rules that could be reviewed to avoid contradictions in the fuzzy scales. Comparison between the same elements, for example: Objective-1 with objective-1 must be of even preference. This will exhibit all the diagonal elements in the matrix equal to 1, 1, 1. Also, if objective-1 has a weak preference with objective-3 equals  $2/3$ , 1, 2, when comparing objective-3 with Objective-1 equals the inverted  $1/2$ , 1,  $3/2$ . There are higher levels to verify the accuracy of decisions and non-contradiction which can be referred to in [277, 328, 352, 363].

### **7.8.3.2 Reliability of statements for AHP/ANP approach**

When the matrix is stable, the standard total for each row shows the relative dominance of each element over the other elements. It also reveals the amount of the other elements' dominance over each element of the total input of each column. Each value must be the inverse of the other, where the product of multiplying the two values is equal to one. It is noticed that the elements in the column are the inverse of the elements in the row of that activity. The total of the elements in each column is to be multiplied by the value of the corresponding row; then the results of all columns are added. It might be important in decision-making problems to know the extent of consistency, since inconsistency leads to weak decision-making. On the other hand, it is very difficult to achieve total consistency, since judgements about elements during processing are relative to the elements, which were relatively constant during comparison. In fact, specific events often influence scales, since these events are changing and not consistent. For example, if objective-1 is preferred to objective-2, and objective-2 is preferred to objective-3, then objective-1 should be preferred to objective-3, in case of full compatible relationship. Sometimes, the same person might prefer objective-3 more than objective-1 based on the nature of work or the rapid technology advances or any other circumstances. To what extent is contradiction considered unfavourable? Usually, judgements cannot be checked, insisting on consistency in the pairwise comparison matrix. Alternatively, we assess our feelings or judgments in all locations, except those located at the diagonal of the matrix (which is always equal to 1) and assume the inverted in the opposite position and search for an answer. The result might not be fully compatible, but this method is often used. It is useful to remember that most of the new ideas that affect our lives lead to rearranging their levels of importance (priorities), so that previous judgements are of little value. If we are determined to never change our views, then we will be afraid to accept new ideas. We should accept in our narrow channel, all the knowledge between the acceptable limit of contradiction and the full consistency. Therefore, there is a need to have a degree of consistency when establishing levels of importance for items or activities based on specific KPIs, in order to obtain acceptable results in practice.

The researcher previously discussed the first part (qualitative) of the mixed method or approach. In the next sections, the researcher discusses the second part of the mixed method approach, i.e., the quantitative approach.

## **7.9 Methodology of the survey (quantitative approach)**

### **7.9.1 Quantitative approach design**

The basic quantitative approach design used here is a survey design. There is one set of collected data: primary data. The collection of primary data is accomplished using a personal survey instrument (questionnaire) to assess the performance of KPIs-AIS in the commercial banks in Jordan.

### **7.9.2 Data collection of quantitative approach**

In order to achieve the aim of this study, the analytical descriptive approach was adopted to test the objectives, by utilising the two following groups of resources (see Sections 7.4.2.1 and 7.4.3.1):

- **Secondary sources**: Secondary sources were used in the theoretical framework of this study. This was conducted through reviewing and consulting a number of books, periodicals, journals, Ph.D. and M.A dissertations, published papers, conferences, and other laws and regulations related to the subject of this particular study.
- **Primary sources**: Primary data was collected by using personally administrated questionnaires to obtain the relevant staffs' perspectives regarding the performance of KPIs-AIS assessment in the commercial banks in Jordan was used in this study. Moreover, interviews were conducted with some of the banking staff in Jordanian commercial banks, in order to benefit from their practical experiences in this field. In addition, some descriptive statistical approaches were applied to analyse the data collected for this study, as will be shown later in this chapter and the next chapter.

### **7.9.3 Population of the study, sample of the study and unit of analysis:**

- a. Population**: The sample population for the study was formed from a group of staff from senior management, middle management, and leaders of operational management in the commercial banks in Jordan. As of September 2011, there were 13 commercial banks as shown in Table 7.10. To be more specific, subjects of the study are the managers or vice-managers (assistants' managers), heads or deputy-heads of departments or vice auditors, bank controllers (inspectors) in these banks (see Table 8.2). Those individuals were targeted by the researcher as they are concerned with the achievement of the business organizations' objectives and the ones responsible for its effectiveness. Those individuals are an integral part of the

AIS. By interacting with other components, they achieve their objectives and guarantee the effectiveness of the system. In other words, they are the best staff to judge the factors -subject of the study- which have an impact on the effectiveness of the AIS. Commercial banks in Jordan were selected to be the subject of the present study, since these institutions meet the requirements of the study. In other words, these institutions are strongly affected by the use of AIS in all its operations. They always keep up with the most important updates in both information technology and modernization of its business organizational structures, to assure an ability to keep up with the surrounding environment.

Table 7.12: Commercial banks in Jordan [364]

The National Commercial Banks	Number of branches including headquarters	Number of mini branches	Number of branches outside Jordan	Year of establishment
Arab Bank	77	-	84	1930
Jordan Ahli Bank	44	3	6	1956
Bank of Jordan	47	27	7	1960
Cairo Amman Bank	51	5	16	1960
Housing Bank for Trade and Finance	96	3	10	1974
Jordan Kuwait Bank	39	10	2	1974
Jordan Commercial Bank	25	-	3	1978
Arab Jordan Investment Bank	9	9	-	1978
Arab Banking Corporation Jordan	14	-	-	1989
Jordan Investment and finance Bank	8	-	-	1989
Jordan Investment and finance Bank	15	2	-	1991
Societe General De Banque-Jordan	16	-	-	1993
Capital bank of Jordan	8	1	-	1996

**b. Sample of the study:** The sample of the study included 422 subjects randomly selected from the population mentioned above. Due to time constraints, the subjects were obtained from three main branches of the three major commercial banks in Jordan. The three banks already have a number of branches distributed on all provinces in Jordan. There is no doubt that the expansion of the sample of the study will lead to a broader variation in the answers of its subjects. The researcher distributed 422 questionnaires and 325 questionnaires were received, while 114 could not be used for analysis because these questionnaires had values missing. They were: refusals to answer, undelivered, non-response, invalid responses, some questions not answered, answered in an unintelligible or unstructured way. Accordingly, the sample is an adequate representation of the sample population at 64.92% (out of 325 questionnaires).



- c. **Unit of Analysis:** The unit of analysis defined in this study comprises the staff members of the commercial banks in Jordan.

#### **7.9.4 Quantitative approach argument**

This study is based on a belief that the fundamental purpose of AIS measurement is not only to implement business organization's strategy, but to also strengthen the mechanism of action. The effectiveness of AIS measurement and performance evaluation helps to identify strategy, which consequently leads to consistency and continuity. The validity of this study can be enhanced by reviewing the previous literature. Most of the previous studies investigate the relationship between strategic implementation and performance assessment (i.e. the direct and indirect relationship between BSC and performance). For example, some researchers (e.g. Davis [192], Lee [345], Patel et al. [274]) provide certain evidence that there is a positive relationship between BSC as linked strategy with business organization line tool and performance. Other researchers (e.g. Lipe and Salterio [233], Ittner and Larcker [237], Banker et al. [231], Kaplan et al. [365]) revealed that the BSC tool is not a unique measure used to reduce the conflict and disagreement between the evaluators. They further suggest increasing the effectiveness of BSC to become a more accurate performance measurement tool. Researchers (e.g. Maltz et al. [269]) illustrate few limitations concerning the efficiency of the BSC tool. Researchers (e.g. Kim et al. [249]) identify the role of AIS as a performance tool on firm assessment. They use the concept of AIS investment and its impact on firm performance by taking the newest technology. Although these researchers agree that AIS investment has a positive impact on firm performance and productivity, no researcher has studied this impact on any of the performance measurement system like the BSC. In recent studies, researchers empirically proposed an assessment framework for AIS function based on the BSC technique AIS-BSC model. With this model, business organizations can empower their business organization and AIS application, in order to achieve integration between them for better performance assessment, such as (Hall [51], Hoque [230], Al Sawalqa [207], Grembergen [264], Saull [264], Stewart [246], Grembergen and Haes et al [293], Martinsons [210]). They construct a AIS- BSC model to enhance firms' performance and productivity. In conclusion, from the researcher's point of view, opinions on this topic are mutually exclusive. The originality of this research is based on the discussion of the major theme of a financial performance system, and constructing an integrated model composed of BSC and AIS indicators. Based on the above, the researcher can argue that these models and studies are general and used in both production and service fields. The significance of this study is that it is based on the basic idea of the

BSC model and its usefulness as an instrument to detect the KPIs which improve the performance of AIS.

### **7.9.5 Method of data analysis**

Data include responses to questions using a five-point Likert scale. The responses for each of the 422 respondents are presented in various forms: raw information, frequency distribution, graphs, means, and standard deviations. The researcher carefully examined the data, discovered and corrected some errors made during data entry stage. In line with that, this study used both descriptive and inferential analysis.

- a. Descriptive analysis:** These analyses are used to identify the KPIs for the performance of AIS in the commercial banks in Jordan.
- b. Inferential analyses:** The researcher developed a questionnaire based on previous questionnaires and literature review. The pre-test was conducted before the pilot study. The instrument was pre-tested by ten respondents. Respondents represented the staff of the commercial banks in Jordan. The pre-test group were asked to review the survey primarily to test the clarity of questions and determine the time required to complete the survey. The group indicated that the length of the survey was vital. The researcher believes that the length of the survey was justified by the need to establish valid measures for the concepts included in the survey. Hence, it was wise to include more questions to test validity. The questionnaire also contained staff demographics.

### **7.9.6 Tool of this study-components, distribution mechanism, and retrieval mechanism**

The general framework of the BSC was identified prior to the questionnaire, through which the overall objectives, as well as sub-objectives, were also identified. Then, the perspectives or dimensions of the study were established. At the end of the model, the KPIs were provided after reviewing the literature in the previous chapters. The researcher designed the questionnaire (Appendix 1) after obtaining enough KPIs used to improve AIS performance.

The questionnaire was distributed to the respondents, who are individuals working in the commercial banks in Jordan. The goal was to solicit their opinions about the impact of the

financial KPIs, customers KPIs, internal processes KPIs, learning and growth KPIs and internal control KPIs on the effectiveness of AIS in those banks. The questionnaire consisted of two sections in addition to a simple preface to guide the respondents and explain the purpose of the study. Following is a brief explanation of the two sections of the questionnaire:

- ▶ **The first section:** The objective of this part was to discover the basic characteristics of banks staffs. This part contains the basic demographic information about the respondent.
  
- ▶ **The second section:** The objective of this part was to measure the KPIs of this study according to Likert's scale of measurement. This was done through 119 items which have been divided into five groups as follows:
  - **Group one:** Focuses on measuring the financial perspective, which included 32 paragraphs.
  - **Group two:** Had 16 items which focused on the measurement of the customer's perspective.
  - **Group three:** Included 23 items to measure the internal business organization processes perspective.
  - **Group four:** Included 22 items to measure the center of learning and growth.
  - **Group five:** Included 26 items to measure the internal control aspects.

Four hundred and twenty-two questionnaires were handed to individuals working in departments related to the AIS in the major banks and their branches in the capital Amman, as well as other provinces. Of these, 325 (77%) of the total questionnaires were received. It should be noted here that 97 questionnaires were ruled invalid and therefore discarded. Therefore, 211 (64.92%) of the received questionnaires were analyzed, as shown in Table 8.1.

### 7.9.7 Mechanisms and procedures applied in analyzing and processing questionnaires' data

In order to facilitate the statistical analysis procedures, a number of prospective answers were identified from which respondents had to choose. The researcher provided five choices for each question, namely: Level of agreement (The points were: 1. strongly disagree 2. disagree 3. neither agree nor not applicable 4. agree and 5. strongly agree). The aim was to find out the subjects' opinions regarding KPIs' impact on improving the effectiveness of AIS in the commercial banks in Jordan. Therefore, the Likert Five-Point Scale was used to measure the level of agreement. Accordingly, the numbers (1, 2, 3, 4, 5) in the Likert scale were used to represent the answers [330], and in a respective order according to Table 7.13 below:

Table 7.13: Levels of agreement and Linguistic values

Levels of agreement	Likert's scale	Total mean	Linguistic values
Strongly agree	5	4 and more	Very high (VH)
Agree	4	3-3.99	High (H)
Neither agree nor applicable	3	2-2.99	Medium (M)
Disagree	2	1-1.99	Low (L)
Strongly disagree	1	Less than 1	Very low (VL)

Each answer to questionnaire items correspond to linguistic values on the Likert scale: (Very high (VH), High (H), Medium (M), Low (L), Very low (VL)). Levels of agreement are determined according to linguistic values and classified based on the total mean of answers, i.e., if the total mean is greater than 4, then this is marked as Very High (VH); if the total mean is 3-3.99, then it is marked as High (H), etc. as explained in Table 7.13.

#### 7.9.7.1 Methodology of Statistical Analysis Applied in Data Processing

The statistical Package for Social Sciences SPSS program (17<sup>th</sup> version) was used in the data analysis. Furthermore, several descriptive and analytical statistical methods have been used to process the data collected to achieve the objectives of this study (see Appendix 2). Following are the most important methods used in the study:

### **First: The Descriptive Statistics Measures:**

Among the most important measures is the arithmetic mean. This represents the most important measure of central tendency, since it reflects the opinion of respondents about the importance of each item in the questionnaire in relation to the central supposed value. In addition, standard deviations were the most important measurement tools that describe any dispersion from the standard means since it shows the extent to which the answers were in agreement for a particular paragraph. It also shows the distribution relative importance, which on its own, represents common characteristics among the members of the study and the percentage of agreement that relates to the arithmetic mean. This relative importance, also, reflects the degree of agreement on the paragraphs of the questionnaire and the relative importance can be calculated by dividing the arithmetic mean of the agreement by the highest relative weight.

### **Second: Deductive Analytical Statistical Measures (Quality of measurements):**

A number of statistical analytic methods were applied to achieve the objectives of the study, namely:

1. Tool Stability Test (Reliability Test): To measure the amount of internal consistency of the instrument, and to what extent the tool is reliable. This was done by calculating Cronbach's  $\alpha$  (see Table 7.14). During this analysis, one inspects the variances of the items and the scales, the Cronbach's  $\alpha$  of the scales, and the change in the Cronbach's  $\alpha$  when an item is deleted from a scale [366].
2. The Normal Distribution Test (Kolmogorov - Smirnov): To determine whether the data is naturally distributed as a condition to apply the stylistic regression and correlation, then it would be possible to generalize the results on the population of the study.
3. One Sample T-Test: To verify if the mean of subjects' answers is greater than the standard hypothesized mean value of the measurement tool (3), and that this increase is not accidental, but rather has a statistical indication at the indication level ( $\alpha \geq 0.05$ ) (see Appendix 2).

### **7.9.7.2 The Reliability of the Study and Its Consistency**

1. **Measurement Tool Reliability:** To ensure the correctness of the questionnaire's items, its relevance to the objectives of the study, and its ability to measure the different variables, the questionnaire was drafted in accordance with the

conventional theory. Then, the questionnaire was arbitrated by professors who work as specialized faculty members in various universities. Their constructive suggestions were applied and a number of modifications followed according to their proposals; the items were modified and re-worded until the current final version of the questionnaire was arrived at. This process took about 45 days.

2. **Testing the Reliability of the Study Tool (Reliability of the Questionnaire):** To test the stability and internal consistency between respondents' answers and the extent to which same results or similar results can be achieved if the test was repeated in similar circumstances. The coefficients internal consistency has been calculated according to Cronbach's  $\alpha$  acceptable value was 0.60 % and above [330]. When this test was used, coefficient's consistency factors ranged between (0.590 - 0.783), while it was 0.796 for the above all perspectives (except for the questions related to the characteristics of individual respondents). This means the existence of a very high degree of internal consistency and that if the questionnaire were distributed again, results would be the same. Therefore, these answers can be relied on to achieve the purposes of the present study and to analyze its results.

Table 7.14: Results of the Study Tool Reliability Test (see Appendix 2)

NO.	The perspectives	Number of paragraphs	Cronbach's Alpha
1	Financial	32	0.783
2	Customers	16	0.590
3	Internal Processes process	23	0.590
4	Learning and Growth	22	0.637
5	Internal Control	26	0.744
<b>6</b>	<b>The Overall perspectives</b>	<b>119</b>	<b>0.796</b>

The methodology of the study was prepared in accordance with the circumstances and requirements of this study. In Chapter 8, the researcher will apply this methodology to analyze study's data in details.

## 7.10 Conclusion

This chapter described the methodology of the study intended to produce a solution to the identified problems. The goals and strategies that will contribute to achieving the objectives of the study have been determined. Also, this chapter defined the BSC tool and the framework of the study, which included a study plan and elements and steps for building and developing a BSC. Since a BSC requires a supporting method for the tool that contributes in

determining several alternative decisions, AHP was used. The researcher defined this method, its purpose, the method of building the AHP approach for all of BSC elements, and the mechanism of giving provisions and weights related to each element separately. In the same context, the researcher determined the methodology of gathering data for the study, either theoretical or from the previous literature or from the study respondents in the commercial banks in Jordan. In order to gather field data, a questionnaire was designed. Details were given about the mechanism for developing and arbitrating it, checking the soundness of its contents, components, distribution and retrieval, in addition to its analyses and testing methods to ensure the soundness of all of its procedures. The use of previous methodology was intended to provide an integrated vision for reasoning links of the purpose and the achieved results and the tool that can be used to provide proper results, leading to achieving the goal of the study. This was achieved by using a scientific method based on determining the purpose of each step before adopting it as a complementary step to its previous and subsequent step. Consequently, all related steps and objectives become more objective, coherent and coordinated, which will be obvious in Chapter 8, when applying the methodology of the study in practice.

# Chapter 8 -

## Data Analysis and Findings

### 8.1 Introduction

The aim of this chapter is to implement the steps that have been identified in the scientific approach of the study presented in Section 7.4. Data were analyzed in three phases (Figure 8.1) in order to achieve the objectives of this study. Analysis started with qualitative data; the second phase analyzed the quantitative which was the questionnaire's data. The third phase compared results of the first and second phases to determine the find weights of the identified KPIs. These phases will be discussed in detail in this chapter.

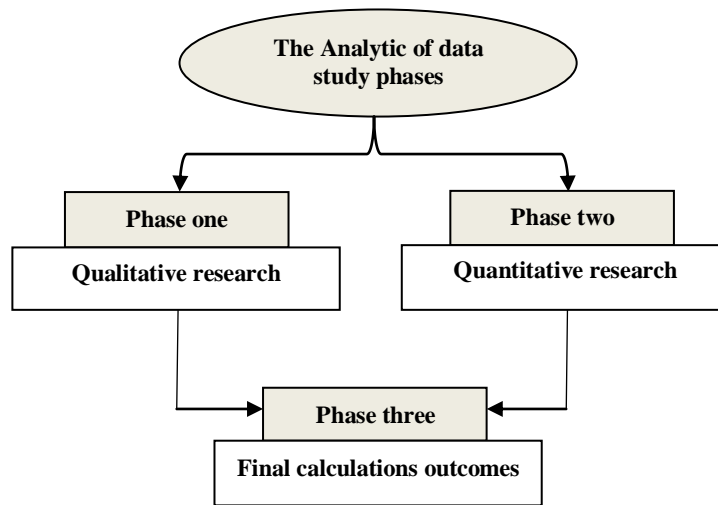


Figure 8.1: The Analytic of data study phases

This chapter aims to analyze data and findings from each of the above mentioned phases as follows:

**Phase one: Qualitative research:** Analysis of data related to building a hierarchical BSC model for improving performance of AIS in the commercial banks in Jordan. The



purpose of this phase is to analyze the preliminary data obtained through methods adopted in Section 7.4.2.1 in order to answer the original question of this study:

*What are the KPIs that will improve the accounting information systems' performance in the commercial banks in Jordan?*

In this phase, random and non-useful data were ignored when the data were organized and modelled in accordance with the BSC method. This phase is significant and prepares for phase two of data analysis; it is rather basic for the procedures of analysing the second phase. The AHP/ANP methods were used to analyse the results of this phase (see Sections 8.4. and 8.9).

**Phase two: Quantitative research:** In this phase, data produced by the survey have been analyzed. The purpose of this phase is to analyze the preliminary data obtained through quantitative research (see Section 7.4.3.1). The goal of this phase is to test the validity of BSC-KPIs to the commercial banks in Jordan. A questionnaire was distributed to the related staff in the commercial banks in Jordan. The SPSS computer programme was used to analyze the data of this phase (see Section 7.4.3.2).

**Phase three: Final calculations outcomes:** In this phase, the results of the previous two phases were compared. The purpose of this phase is to reveal any discrepancies of BSC elements' weights determined in the theoretical (phase one) and practical (phase two). The purpose of the comparison is to determine KPIs weights, which will then be considered as a standard of AIS performance, prepared a fair and factual method to the society of the study. The AHP/ANP and SPSS methods were adopted to analyze the results of this phase (see Section 8.10).

In the next section, the first phase of data analysis is discussed, based on organizing the previous phases.

### **8.1.1 Levels of BSC hierarchical model**

The hierarchical model of BSC consists of four levels (see Section 7.8.1). They are goal in level 1, strategies in level 2, perspectives in level 3, KPIs in level 4. The researcher will analyze this model in accordance with these levels as follows:

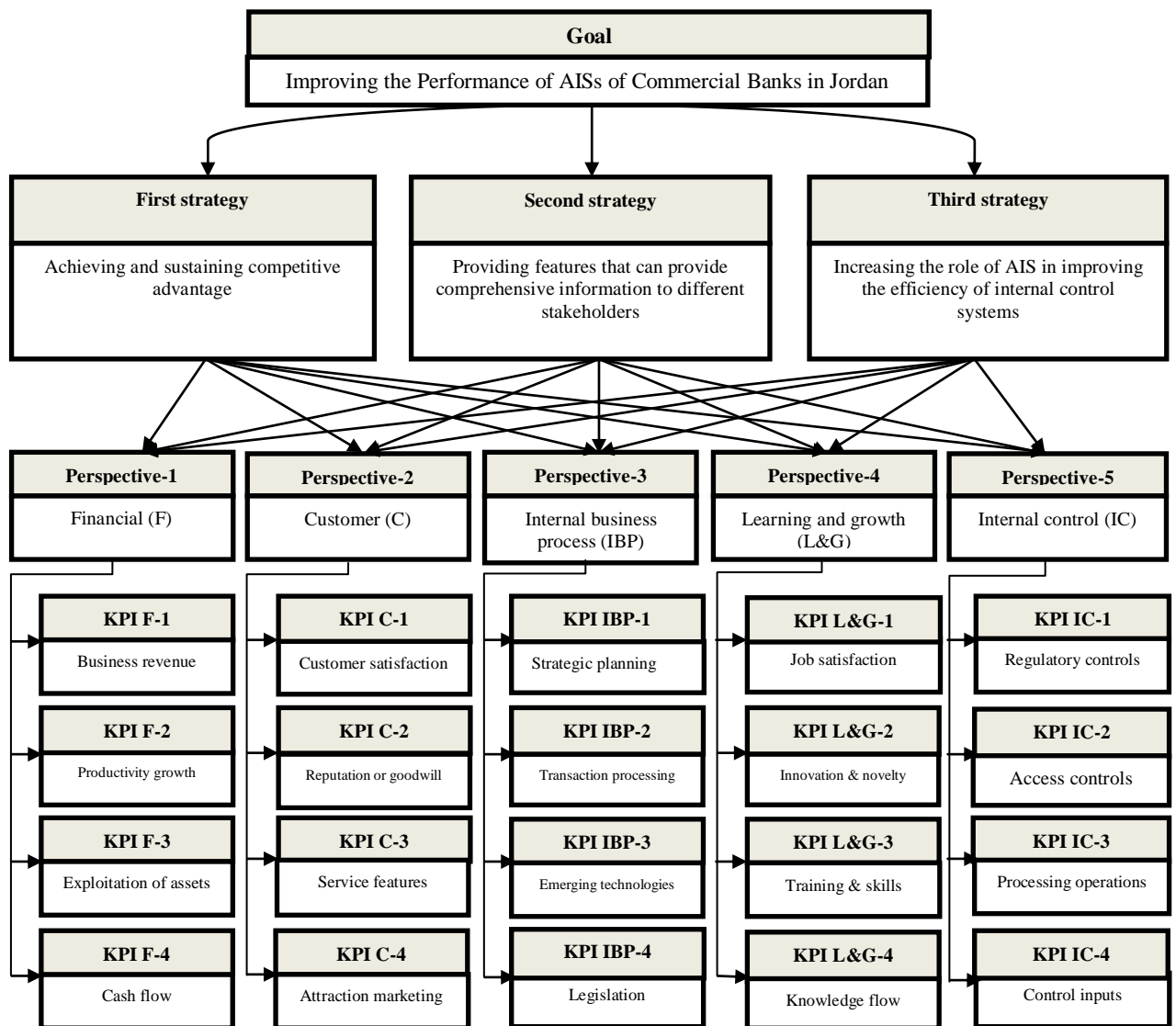


Figure 8.2: Setting the study AHP framework

Figure 8.2 shows the BSC elements proposed to achieve the objectives of this study. BSC elements have been prepared in this format based on the previous literature, Jordanian banks' annual reports, interviews conducted with staff of the commercial banks in Jordan, and notes and directions obtained by the researcher from academics in the universities who are concerned with the subject of the study (see Section 7.4.2.1). BSC elements can be classified as in Figure 8.2 according to the following levels:

**Level 1:** The goal was clearly determined as “Improving AIS performance at the commercial banks”, where the goal is the vision.

**Level 2:** To implement this goal, three strategies are created, which represent the objectives to be adopted to achieve the goal. These strategies are:

**First strategy:** Achieving and sustain competitive advantage.

**Second strategy:** Providing features that can provide comprehensive information to different stakeholders.

**Third strategy:** Increasing the role of AIS in improving the efficiency of internal control systems.

**Level 3:** The strategies identified in the previous level require perspectives to be implemented in the commercial banks for the achievement of the goal. To achieve that five perspectives were determined. They are (Financial (F), Customer (C), Internal Business Process (IBP), Learning and Growth (L&G), Internal Control (IC)). These perspectives are derived from the BSC model, as mentioned previously (see Section 7.4.1).

**Level 4:** KPIs were determined after reviewing the literature related to the study. These KPIs were discussed in relation to the practices of the commercial banks in Jordan in order to check their soundness, and exclude other KPIs previously discussed in this environment, emphasizing the related KPIs of this study only and merging the involved functions. Twenty KPIs were defined under the different perspectives as shown in Figure 8.2, representing the most popular KPIs in the Jordanian banking environment. As with the strategies and BSC-perspectives, the relative importance of each KPI under a BSC-perspective varies.

The levels of a BSC hierarchical model are adopted as a basis for analysing the data of all study phases in order to obtain reliable results for later comparison.

## **8.2 Quantitative data analysis “Phase one”**

As mentioned in Section 7.7, AHA/ANP is used to determine the local weights of the strategies, BSC perspectives and KPIs. In order to obtain the total of these weights, the mathematical method, explained in Section 7.8.3, is used as follows.

a. Determine the local weights of the strategies that improving the performance of the AISs of commercial Banks in Jordan (BSC-goal) (see Section 8.2.1).

- b. Determine the local weights of the BSC-perspectives that achieved the strategies (see Section 8.2.2).
- c. Determine the local weights of the KPIs based on BSC-perspectives (see Section 8.2.3).
- d. Use ANP to determine the interdependence weights of the BSC-perspectives (see Section 8.2.4).
- e. Calculate the global weights for the performance of BSC-KPIs (see Section 8.2.5).

In the next sections, AHP is used to determine the local weights of the strategies, BSC-perspectives and KPIs, as mentioned in the previous points.

### 8.2.1 Determine the local weights of the strategies that achieve BSC-goal

It is reasonable that the three strategies of BSC achieve the goal by implementing them as one group. But it is not reasonable to expect that all of them will have the same capacity or importance to achieve the goal. What controls this issue is the extent of the fuzzy relationship between the strategies. This requires using the pairwise comparison matrix of strategies to assess the fuzzy relationships. The pairwise comparison matrix is used for detecting the local weights of the BSC strategies in accordance with adopted relative importance for this purpose as shown in Figure 8.3 and Table 8.1, by using the process mentioned in Section 7.8.

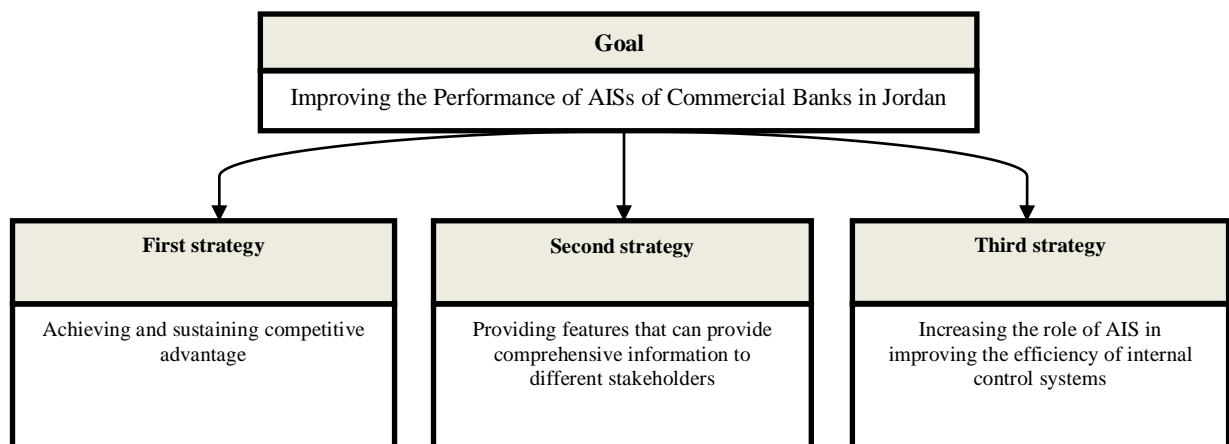


Figure 8.3: BSC strategies that achieved BSC-goal

Table 8.1: Local weights and pairwise comparison matrix of strategies that achieved

BSC-goal

Goal	First strategy	Second strategy	Third strategy	Weight
First strategy	1, 1, 1	3/2, 2, 5/2	2/3, 1, 2	<b>0.429</b>
Second strategy	2/5, 1/2, 2/3	1, 1, 1	3/2, 2, 5/2	<b>0.360</b>
Third strategy	1/2, 1, 3/2	2/5, 1/2, 2/3	1, 1, 1	<b>0.211</b>

Results presented in Table 8.1 indicate that the first strategy achieved the highest weight of 42.9%, while the second and third strategies achieved a weight of 36% and 21.1% respectively. This percentage denotes the relative importance and prevalence of the first strategy over the other two strategies in achieving the goal. It also denotes that the second strategy is relatively stronger than the third in achieving the goal.

**8.2.2 Determine the local weights of the BSC-perspectives that achieved the strategies**

After determining the strategic relative importance of strategies as shown in Table 8.1, in the same way, the BSC-perspective weights were defined on the basis of these three strategies. Pairwise comparison matrices as shown in Figure 8.4 and Table 8.2 were created for this purpose together with the calculated weights [328].

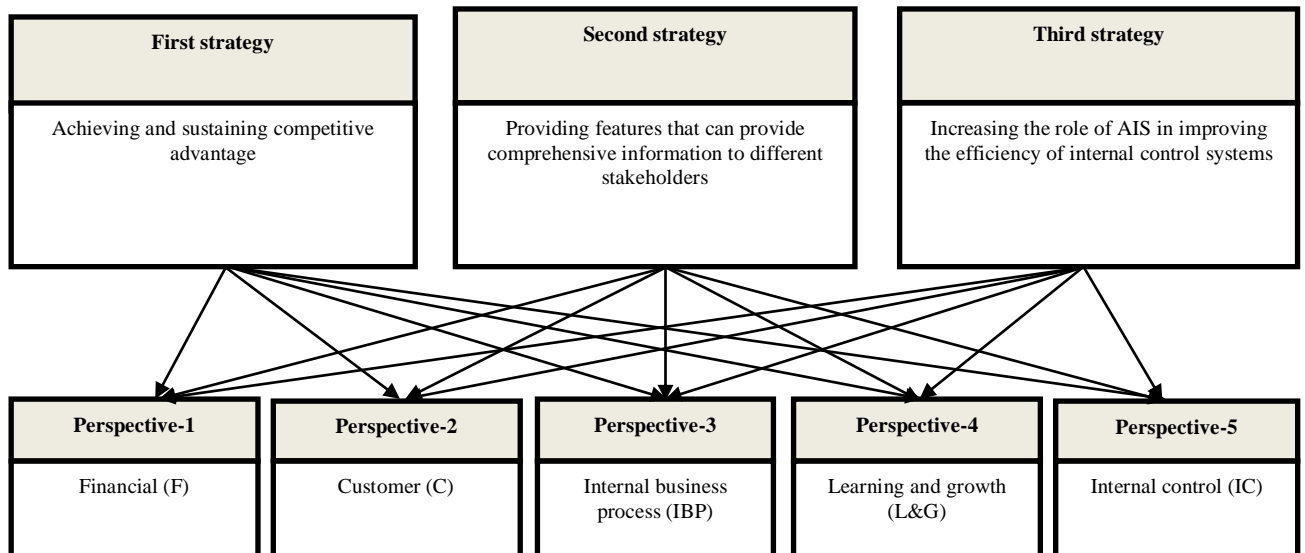


Figure 8.4: BSC-perspectives that achieved the strategies

Table 8.2: Local weights and pairwise comparison matrix of BSC-Perspectives that achieved the strategies

First Strategy	F	C	IBP	L&G	IC	Weight
F	1, 1, 1	5/2, 3, 7/2	3/2, 2, 5/2	1, 3/2, 2	½, 1, 3/2	<b>0.33</b>
C	2/7, 1/3, 2/5	1, 1, 1	3/2, 2, 5/2	3/2, 2, 5/2	½, 1, 3/2	<b>0.23</b>
IBP	2/5, 1/2, 2/3	2/5, 1/2, 2/3	1, 1, 1	1, 3/2, 2	1, 3/2, 2	<b>0.16</b>
L&G	½, 2/3, 1	2/5, 1/2, 2/3	½, 2/3, 1	1, 1, 1	1, 3/2, 2	<b>0.12</b>
IC	2/3, 1, 2	2/3, 1, 2	½, 2/3, 1	½, 2/3, 1	1, 1, 1	<b>0.16</b>

Second strategy	F	C	IBP	L&G	IC	Weight
F	1, 1, 1	½, 1, 3/2	½, 2/3, 1	½, 2/3, 1	½, 2/3, 1	<b>0.10</b>
C	2/3, 1, 2	1, 1, 1	2/3, 1, 2	½, 2/3, 1	½, 2/3, 1	<b>0.16</b>
IBP	1, 3/2, 2	½, 1, 3/2	1, 1, 1	5/2, 3, 7/2	2, 5/2, 3	<b>0.36</b>
L&G	1, 3/2, 2	1, 3/2, 2	2/7, 1/3, 2/5	1, 1, 1	3/2, 2, 5/2	<b>0.23</b>
IC	1, 3/2, 2	1, 3/2, 2	1/3, 2/5, 1/2	2/5, ½, 2/3	1, 1, 1	<b>0.14</b>

Third strategy	F	C	IBP	L&G	IC	Weight
F	1, 1, 1	1, 3/2, 2	2/5, 1/2, 2/3	2/5, 1/2, 2/3	2/5, 1/2, 2/3	<b>0.02</b>
C	½, 2/3, 1	1, 1, 1	½, 2/3, 1	½, 2/3, 1	½, 2/3, 1	<b>0.02</b>
IBP	3/2, 2, 5/2	1, 3/2, 2	1, 1, 1	2, 5/2, 3	1/3, 2/5, 1/2	<b>0.33</b>
L&G	3/2, 2, 5/2	1, 3/2, 2	1/3, 2/5, 1/2	1, 1, 1	1/3, 2/5, 1/2	<b>0.16</b>
IC	3/2, 2, 5/2	1, 3/2, 2	2, 5/2, 3	2, 5/2, 3	1, 1, 1	<b>0.47</b>

Results shown in Table 8.2 denote that the financial perspective achieved a local weight of 33% in achieving the first strategy, while the IBP perspective had a local weight of 36% in achieving the second strategy. The internal control perspective was 47% in achieving the third strategy. These results were in harmony with the nature, purpose and function of each perspective.

### 8.2.3 Determine the local weights of the KPIs based on BSC-perspectives

Figure 8.5 and Table 8.3 show the local weights of the BSC-KPIs which represent the extent of relative importance between KPIs that achieve each and all of the proposed BSC-perspectives.

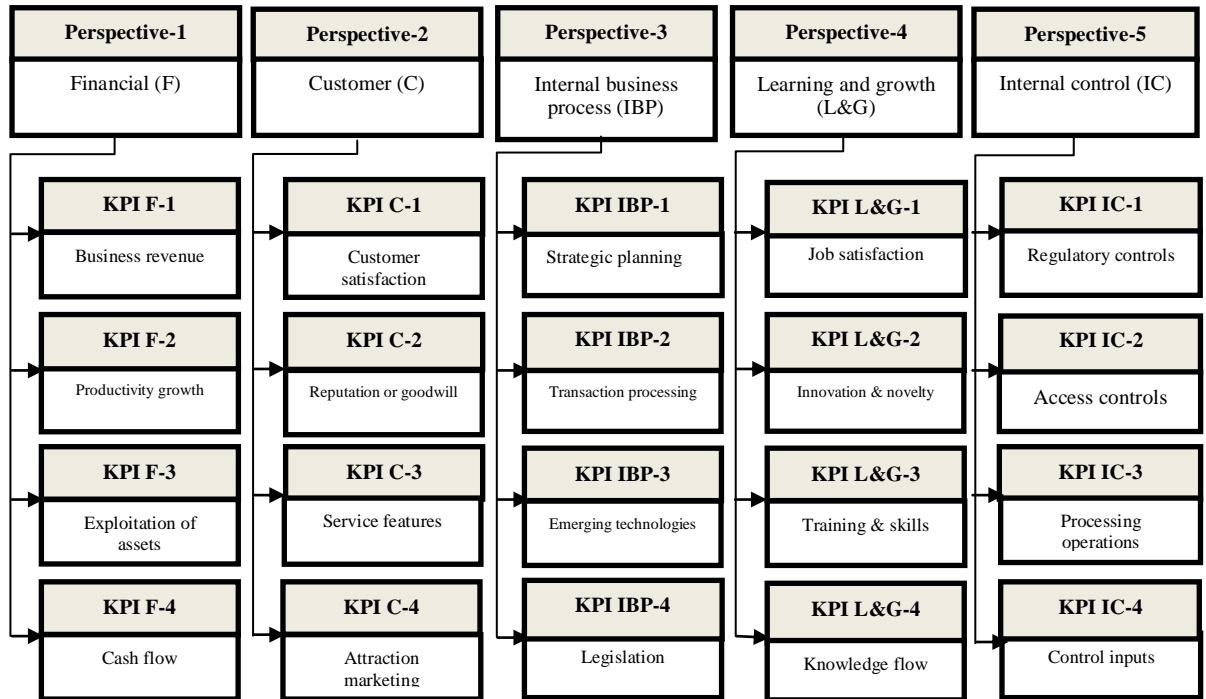


Figure 8.5: KPIs based on BSC-perspectives

Table 8.3: Local weights and pairwise comparison matrix of BSC-KPIs

F	F-1	F-2	F-3	F-4	Weight
F-1	1, 1, 1	1, 3/2, 2	1, 3/2, 2	3/2, 2, 5/2	<b>0.38</b>
F-2	½, 2/3, 1	1, 1, 1	1, 3/2, 2	1, 3/2, 2	<b>0.29</b>
F-3	½, 2/3, 1	½, 2/3, 1	1, 1, 1	½, 2/3, 1	<b>0.13</b>
F-4	2/5, 1/2, 2/3	½, 2/3, 1	1, 3/2, 2	1, 1, 1	<b>0.20</b>

C	C-1	C-2	C-3	C-4	Weight
C-1	1, 1, 1	2/3, 1, 2	½, 2/3, 1	1, 1, 1	<b>0.22</b>
C-2	½, 1, 3/2	1, 1, 1	2/3, 1, 2	½, 1, 3/2	<b>0.25</b>
C-3	1, 3/2, 2	½, 1, 3/2	1, 1, 1	1, 3/2, 2	<b>0.30</b>
C-4	1,1,1	2/3, 1, 2	½,2/3,1	1,1,1	<b>0.22</b>

IBP	IBP-1	IBP-2	IBP-3	IBP-4	Weight
IBP-1	1, 1, 1	2, 5/2, 3	1/3, 2/5, 1/2	3/2, 2, 5/2	<b>0.34</b>
IBP-2	1/3, 2/5, 1/2	1, 1, 1	3/2, 2, 5/2	2/5, 1/2, 2/3	<b>0.16</b>
IBP-3	2, 5/2, 3	2/5, 1/2, 2/3	1, 1, 1	1, 3/2, 2	<b>0.31</b>
IBP-4	2/5,1/2,2/3	3/2,2,5/2	½,2/3,1	1,1,1	<b>0.19</b>

L&G	L&G-1	L&G-2	L&G-3	L&G-4	Weight
L&G-1	1, 1, 1	2/3, 1, 2	2/3, 1, 2	1, 1, 1	<b>0.27</b>
L&G-2	½, 1, 3/2	1, 1, 1	1, 1, 1	2/3, 1, 2	<b>0.27</b>
L&G-3	½, 1, 3/2	1, 1, 1	1, 1, 1	1, 1, 1	<b>0.27</b>
L&G-4	1, 1, 1	½, 1, 3/2	1, 1, 1	1, 1, 1	<b>0.19</b>

IC	IC-1	IC-2	IC-3	IC-4	Weight
IC-1	1, 1, 1	1, 1, 1	2/3, 1, 2	2/3, 1, 2	0.25
IC-2	1, 1, 1	1, 1, 1	1, 1, 1	2/3, 1, 2	0.25
IC-3	½, 1, 3/2	1, 1, 1	1, 1, 1	1, 1, 1	0.25
IC-4	½, 1, 3/2	½, 1, 3/2	1, 1, 1	1, 1, 1	0.25

Results shown in Table 8.3 indicate that the highest proportional local weight that contributes to achieving the financial perspective is KPI: F-1 with 38% of the total proportion that contributes to achieving the perspective. The highest proportional local weight that contributes to achieving the customer perspective is KPI: C-3 with 30%. The highest proportional local weight that contributes to achieving the internal business perspective is KPI: IBP-1 with 34%, whereas, weight proportions were equal for each of the KPIs: L&G-1, L&G-2 and L&G-3 in achieving the learning and growth perspective with 27% for each. Also, all KPIs local weights that contribute to achieving the internal control perspectives are equal with 25% for each. Close or equal rates can be related to the equal distribution among KPIs in achieving the purpose of the perspectives for which they have been set.

After determining the local weights of the strategies, BSC perspectives and KPIs by using the AHP, the ANP is used to determine the dependence among the BSC perspectives, which will be discussed in the next sub-section.

#### **8.2.4 Using ANP to determine the interdependence weights of the BSC-perspectives**

In the ANP approach, the interdependent weights of the BSC perspectives are determined. Kaplan and Norton [157] and Ravi [336] used this to determine the interdependent weights among BSC perspectives [328]. Once the individual weights between the different BSC-perspectives, KPIs and strategies were defined, the next step is to determine their interdependence. It is necessary to compare the BSC-perspectives in order to determine their direction and dependence before calculating the global weights for the performance of AIS-KPIs and fuzzy relationships. Interdependent weights of the BSC-perspectives are calculated and the dependencies among the perspectives are considered. Dependence among the perspectives is determined by analysing the impact of each BSC-perspective on every other perspective using pairwise comparisons [328]. Figure 8.3 shows the interdependence among the BSC-perspectives.



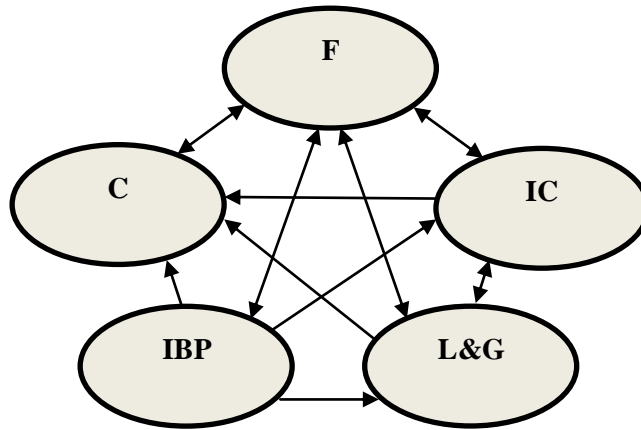


Figure 8.6: Interdependent among the BSC-perspectives

The above figure reveals that the interdependence (relationships) among BSC-perspectives is unequal, i.e., it is not in one direction. For example, the financial perspective has bi-directional relationship (affects and affected) with all of the other perspectives (customer, learning and growth, internal business process, internal control). However, the customer perspective has only one bi-directional relationship with the financial perspective; and none with others. This could be attributed to the fact that the customer perspective has no operational impact on learning and growth, internal business process or internal control as a result of its function. This method was used to determine all of the other relationships between the BSC-perspectives. Based on the interdependencies (relationships) presented in Figure 8.3, pairwise comparison matrices are formed for the BSC-perspectives (financial (F), customer (C), Internal Business Process (IBP), and Internal Control (IC)) as shown in Tables 8.4-8.7. And their weights are calculated by using the method in Section 7.8.

Table 8.4: The inner interdependence matrix of the perspectives with respect to  
“Financial perspective”

<b>F</b>	<b>C</b>	<b>IBP</b>	<b>L&amp;G</b>	<b>IC</b>	<b>Weight</b>
<b>C</b>	1, 1, 1	2/5, 1/2, 2/3	1, 3/2, 2	2/5, 1/2, 2/3	<b>0.16</b>
<b>IBP</b>	3/2, 2, 5/2	1, 1, 1	1/2, 2/3, 1	3/2, 2, 5/2	<b>0.34</b>
<b>L&amp;G</b>	1/2, 2/3, 1	1, 3/2, 2	1, 1, 1	1, 3/2, 2	<b>0.27</b>
<b>IC</b>	3/2, 2, 5/2	2/5, 1/2, 2/3	1/2, 2/3, 1	1, 1, 1	<b>0.23</b>

Results shown in Table 8.4 indicate that the highest proportional weight that contributes to achieving the F-perspective is the IBP-perspective that has a weight of 34%.

Table 8.5: The inner interdependence matrix of the perspectives with respect to  
 “Customer perspective”

<b>C</b>	<b>F</b>	<b>IBP</b>	<b>L&amp;G</b>	<b>IC</b>	<b>Weight</b>
<b>F</b>	1, 1, 1	½, 1, 3/2	1, 3/2, 2	½, 1, 3/2	<b>0.28</b>
<b>IBP</b>	2/3, 1, 2	1, 1, 1	3/2, 2, 5/2	3/2, 2, 5/2	<b>0.37</b>
<b>L&amp;G</b>	½, 2/3, 1	2/5, 1/2, 2/3	1, 1, 1	2/5, 1/2, 2/3	<b>0.07</b>
<b>IC</b>	2/3, 1, 2	2/5, 1/2, 2/3	3/2, 2, 5/2	1, 1, 1	<b>0.28</b>

Results shown in Table 8.5 indicate that the highest proportional weight that contributes to achieving the C-perspective is the IBP-perspective that has a weight of 37%.

Table 8.6: The inner interdependence matrix of the perspectives with respect to  
 “Internal Business Process perspective”

<b>IBP</b>	<b>F</b>	<b>L&amp;G</b>	<b>IC</b>	<b>Weight</b>
<b>F</b>	1, 1, 1	½, 1, 3/2	1, 3/2, 2	<b>0.39</b>
<b>L&amp;G</b>	2/3, 1, 2	1, 1, 1	3/2, 2, 5/2	<b>0.45</b>
<b>IC</b>	½, 2/3, 1	2/5, 1/2, 2/3	1, 1, 1	<b>0.16</b>

Results shown in Table 8.6 indicate that the highest proportional weight that contributes to achieving the IBP-perspective is the L&G-perspective that has a weight of 45%.

Table 8.7: The inner interdependence matrix of the perspectives with respect to  
 “Internal Control perspective”

<b>IC</b>	<b>F</b>	<b>IBP</b>	<b>L&amp;G</b>	<b>Weights</b>
<b>F</b>	1, 1, 1	2/3, 1, 2	½, 2/3, 1	<b>0.26</b>
<b>IBP</b>	½, 1, 3/2	1, 1, 1	3/2, 2, 5/2	<b>0.37</b>
<b>L&amp;G</b>	1, 3/2, 2	2/5, 1/2, 2/3	1, 1, 1	<b>0.37</b>

Results shown in Table 8.7 indicate that the highest proportional weight that contributes to achieving the IC-perspective is IBP-perspective and L&G-perspective; each has a weight of 37%.

### 8.2.5 Calculate the global weights for the performance of BSC-KPIs.

Once the individual weights of the KPIs and the interdependence weights between the perspectives were defined, then the next step is to compute the global weights of the KPIs:

#### Step 1: Calculate relative importance weights of strategies with BSC-perspectives.

In order to relate local weights and the emerging relations between strategies and BSC-perspectives (Tables 8.1 and 8.2), a pairwise comparison matrix has to be created in its final form as follows:

#### **Matrix 1:**

$$= \begin{pmatrix} F \\ C \\ IBP \\ L\&G \\ IC \end{pmatrix} = \begin{pmatrix} 0.33 & 0.10 & 0.02 \\ 0.23 & 0.16 & 0.02 \\ 0.16 & 0.36 & 0.33 \\ 0.12 & 0.23 & 0.16 \\ 0.16 & 0.14 & 0.47 \end{pmatrix} \times \begin{pmatrix} 0.429 \\ 0.360 \\ 0.211 \end{pmatrix} = \begin{pmatrix} 0.18 \\ 0.16 \\ 0.27 \\ 0.18 \\ 0.22 \end{pmatrix}$$

Weights have been calculated using the AHP method in order to reveal any fuzziness between strategies and BSC-perspectives, since all relations contribute to achieving the strategies. All relations should be considered on this basis, without ignoring any weight of any relation. In the matrix 1, results of weights have been multiplied by the last column in Table 8.2, weights of BSC-Perspectives with sub-objectives and the results of Table 8.1 matrix and weights sub-objectives with goal. The purpose of this process is to detect the diverse relationships between the strategies on the one hand and the diversified relations between the perspectives on the other. Results of the previous matrix show the diverse and fuzzy relationships in the form of total weights. The results of these weights can be indexed sequentially in order of importance, as follows: (IBP: 0.27, IC: 0.22, F: 0.18, L&G: 0.18, C: 0.16), noting that the F and L&G perspectives have the same weight, which denotes that they are equally significant.

#### Step 2: Calculate interdependent weights of BSC-Perspectives.

The computed relative importance weights are used in this step; the dependence matrix of the BSC-perspectives is formed as shown in Matrix 2 follows:

**Matrix 2:**

$$= \begin{pmatrix} F \\ C \\ IBP \\ L\&G \\ IC \end{pmatrix} = \begin{pmatrix} 1 & 0.28 & 0.39 & 1 & 0.26 \\ 0.16 & 1 & 0 & 0 & 0 \\ 0.34 & 0.37 & 1 & 0 & 0.37 \\ 0.27 & 0.07 & 0.45 & 1 & 0.37 \\ 0.23 & 0.28 & 0.16 & 0 & 1 \end{pmatrix} \times \begin{pmatrix} 0.18 \\ 0.16 \\ 0.27 \\ 0.18 \\ 0.22 \end{pmatrix} = \begin{pmatrix} 0.28 \\ 0.09 \\ 0.24 \\ 0.22 \\ 0.17 \end{pmatrix}$$

Interdependent weights of the BSC-perspectives are computed by multiplying the dependence matrix of the BSC-perspectives (Matrix 1) that were obtained with the local weights of perspectives provided in Section 8.3.3 (Tables 8.4-8.7). The interdependent weights of the perspectives are calculated as follows [328]. The weights' results in Matrix 2 can be indexed in accordance with the relatively most important consecutively as follows: (F: 0.28, IBP: 0.24, L&G: 0.22, IC: 0.17, C: 0.09). After detecting weights of relations and directions, and determining the relative importance of all the factors in a hierarchical shape, global weights can be reached for these integrated relationships with the following step.

**Step 3: Compute the global weights of BSC-KPIs.**

Global KPIs weights are computed by multiplying the local weight of BSC-perspectives (Matrix 2) with the interdependent weights of the KPIs (Table 8.3) to which it belongs as follows.

Table 8.8: Computed global weights of performance indicators

BSC-perspectives	Interdependent BSC-perspectives	BSC-KPIs	KPIs-weights (Table8.3)	global weight
<b>F</b>	0.28	<b>F-1</b>	0.38	<b>0.106</b>
		<b>F-2</b>	0.29	<b>0.081</b>
		<b>F-3</b>	0.13	<b>0.036</b>
		<b>F-4</b>	0.20	<b>0.056</b>
<b>C</b>	0.09	<b>C-1</b>	0.22	<b>0.019</b>
		<b>C-2</b>	0.25	<b>0.022</b>
		<b>C-3</b>	0.30	<b>0.027</b>
		<b>C-4</b>	0.22	<b>0.019</b>
<b>IBP</b>	0.24	<b>IBP-1</b>	0.34	<b>0.081</b>
		<b>IBP-2</b>	0.16	<b>0.038</b>
		<b>IBP-3</b>	0.31	<b>0.074</b>
		<b>IBP-4</b>	0.19	<b>0.045</b>
<b>L&amp;G</b>	0.22	<b>L&amp;G-1</b>	0.27	<b>0.059</b>
		<b>L&amp;G-2</b>	0.27	<b>0.059</b>
		<b>L&amp;G-3</b>	0.27	<b>0.059</b>
		<b>L&amp;G-4</b>	0.19	<b>0.041</b>
<b>IC</b>	0.17	<b>IC-1</b>	0.25	<b>0.042</b>
		<b>IC-2</b>	0.25	<b>0.042</b>
		<b>IC-3</b>	0.25	<b>0.042</b>
		<b>IC-4</b>	0.25	<b>0.042</b>

Global weights in Table 8.8 have been calculated by multiplying each KPI weight (Table 8.3) by the results of perspectives results' weights in (Matrix 2). With these results, the study achieved its objective of obtaining global weights that can be later compared with the weights obtained later through the field analysis quantitative (survey) (second phase), as explained in the next section .

In Section 8.3, the quantitative (survey) data analysis “Phase two” is conducted as follows:

### **8.3 Quantitative (survey) data analysis “Phase two”**

Before examining the results obtained from the study survey as they pertain to demographic factors related of the staff in commercial banks in Jordan, the demographic characteristics of the population are first described. By establishing the traits of the respondents, this study can begin to assess the extent to which the results can be generalized.

#### **8.3.1 Responses profile of the administration questionnaire**

The subjects used in this study were the AIS personnel in the commercial banks in Jordan. The survey measured: demographic factors and KPIs-related factors scale for the evaluation of the AIS personnel. The survey was personally administrated to the subjects. Table 8.9 shows information regarding population and return rates of the questionnaire sent to the staff members in the commercial banks in Jordan. Of the 422 questionnaires administered, 385 subjects were distributed but only 211 responses from the staff members in the commercial banks in Jordan were received resulting in a response rate of 64.92%.

Table 8.9: Summary of response rates

Questionnaires administrated	422
Undelivered	97
Subjects contacted	325
No. of responses	211
Response rates (211 / 325)	64.92%

### 8.3.2 The demographic data by individual respondents from commercial banks in Jordan

The demographic information was gathered from each subject and data was collected to address a specific research question. It provides an insight into the subjects and assists in interpreting results of the analysis. The demographic variables are: qualification, study major, functional level, work experience, and experience in accounting. A summary of the demographic data collected from the staff members in commercial banks in Jordan is shown in Table 8.10.

Table 8.10: Summary of the demographic data by individual respondents from commercial banks in Jordan

NO.	Demographic	Characteristics	Frequency	Percentage
1	Qualification	Diploma	4	1.9
		Bachelor's degree	201	95.3
		Master degree	6	2.8
2	Specialization (study area)	Accounting	58	27.5
		Management	68	32.2
		Economic	25	11.8
		Finance	19	9.0
		AIS	41	19.4
3	Job Title (current position)	Manager or vice /assistant manager	50	23.7
		Head of a department or vice /assistant Head of the department	56	26.5
		Auditor	97	46.0
		Bank controller (Inspector of a bank)	8	3.8
4	Experience in banks	Less than 3 years	20	9.5
		3-7 years	31	14.7
		7-11 years	71	33.6
		11-15 years	73	34.6
		More than 15years	16	7.6
5	Experience in accounting	Less than 5 years	68	32.2
		5-10 years	109	51.7
		10-15 years	33	15.6
		More than 15 years	1	0.5

1. **Qualifications:** About 1.9% (4) of the respondents have a diploma while 95.3% (201) have a bachelor degree and 2.8% (6) have a master degree. From the results, it is observed that the percentage of the staff members in commercial banks in Jordan who have a bachelor degree is higher than the percentage of the staff members who have a diploma or master degree.
2. **Specialization (study area):** Meanwhile, 27.5% (58) of the respondents have degree major in accounting, 32.2 % (68) are management, 11.8% (25) are economics, 9.0% (19) are finance and 19.4% (41) are AIS holders. Consequently, the percentage of the staff members who have major in management is higher than those with majors in accounting, economics, finance and AIS.
3. **Job Title (current position):** Results indicate that 46.0% (97) of staff members are auditors, since they are the most important users of AIS in banks' financial departments. The remaining 23.7% (50) were Managers, Assistant Managers, Department Head or Assistant Head positions. 26.5% (56) held bank controller (inspector of a bank) positions, and 3.8% (8) held bank Controller (Inspectors of banks) positions. This is a low percentage compared with others since there is usually only one person in this position in most bank branches. Results show that most staff members are associated with accounting and management, which emphasizes the awareness of respondents to the items of the questionnaire that need precise and objective answers. The researcher was keen to distribute the questionnaire to as many personnel as possible at each level in the hierarchy of positions in order to ensure full representation of all levels and categories of the study sample.
4. **Experience in banks:** Years of experience plays an important role in respondents' performance, since more years of experience means more knowledge and awareness of staff resulting in to work, and increase in staff's ambitions and demands. Analysis of results also reveals that about 9.5% (20) of the respondents have less than 3 years of experience in banking institutions. Also, 14.7% (31) have 3-7 years of experience, 33.6% (71) have 7-11years of banking experience, and 34.6% (73) have 11-15 years; while 7.6% (16) have experience of more than 15 years. In fact, this result shows that 9.5% of staff members who have less than 3 years of experience in banks are less than those who have 3-7 years, 7-11years, and 11-15 years. This result shows that commercial banks' staff members have enough experience in evaluating the performance of AIS in their banks. These total results show the adequacy of the

target sample's experience, enabling them to respond with sound answers to the items in the questionnaire.

5. **Experience in accounting:** With regard to the experience in accounting, about 32.2% (68) of the respondents have 5 or more years of experience in accounting, while 67.8% (143) have more than 6 years. This result tells us that the percentage of those who have less than 5 years of experience in accounting are less than those who have more than 5 years' experience. This experience suggests that the staff is capable of evaluating the performance of AIS in the banks as well. As mentioned earlier, the qualifications, experience in auditing, and experience in accounting strengthen the respondents' ability to evaluate the performance of AIS in banks.

In the next section, the researcher discusses the goodness of data (credibility of questionnaire).

## **8.4 Goodness of data (credibility of questionnaire)**

This study's questionnaire should provide valid, reliable and credible data , relevant to the objectives of the study and able to measure its target elements [367]. Based on these requirements which should guarantee sound results, the researcher adopted the most popular tests to check the validity and consistency of the questionnaire [368] as follows:

### **8.4.1 Validity of questionnaire**

The purpose of testing validity is to know the extent to which the KPIs can reliably achieve their purpose, and check if the operational definition of these indicators reflects the reality of the true meaning of the theoretical concept of KPI [369]. This would guarantee the internal validity and the extent of establishing measures according to causal relations. Here, the function of each measurement should be taken into consideration, in order to design and formulate the measure properly, relying on the theories used to support the function of this measure [370]. The issue of validity is discussed below.



#### **8.4.1.1 Content validity of questionnaire**

Content validity refers to the extent to which the questionnaire's contents reflect the established scope of the study [371]. To verify the questionnaire's content validity it was presented to several professors, associates and staff specializing in AIS. The questionnaire was also presented to some of the staff representing all levels of commercial banks' employees in Jordan, who were requested to check the adequacy of the submitted criteria in the questionnaire. Also, they were asked to verify whether the questionnaire items were phrased clearly, correctly and unambiguously, and were given the opportunity to make amendments and suggestions. Following this, repetitions of words or criteria were avoided, and amendments were made under the guidance of the supervisor. Murphy [372], created three general steps related to content validity: describe content domain, determine areas of content domain that test item and compare the structure of the test with the structure of content domain. In addition to that, Sekaran [373] and Walsh [374] showed that types of evidence supporting content validity involve the judgment of those who construct the survey or other experts familiar with the topic area. Furthermore, it also involves establishing greater reliability of internal consistency. The previous methods assisted the researcher to determine the situations and fields intended to be measured, which was emphasized by Edward et al. [371]. The final result of this verification was that there is a general consistency in answers regarding the survey of the study and that it covers all targeted aspects [330, 368].

#### **8.4.1.2 Construct validity of questionnaire**

The purpose of testing construct validity is to verify the congruence between the theoretical concept and the adopted criterion or procedure regarding the measure. The study seeks to verify that there are no similar or identical relationships between the measures in terms of function or concept.

This test guided the researcher to detect each of the target elements to be measured to verify its integrity, relevance to the aim to be achieved and its capacity of achievement. The researcher adopted three steps to establish validity:

1. Determine the theoretical relationship between the domain elements.
2. Ascertain and discuss relationships between these elements, determine their behavior, their impact on each other and their common aims.
3. Verify the measures and evaluate them by testing their results.

In the next section, the researcher discusses the data analysis of respondents' answers.

## 8.5 Data analysis of respondents' answers

For data analysis of respondents' answers, the researcher adopted the descriptive statistics method, whereby the mean, standard deviation, and materiality for the sample's answers were extracted for each item. The researcher used the results of the survey to determine the extent of the respondents' consensus on the various items of the questionnaire. SPSS schedules (Appendix 2) were used to extract mean and standard deviation, while materiality was calculated by dividing each mean of an item by the total of mean values for the classification of the item; for example, the materiality of financial perspective of the BSC-perspective, is extracted as follows:

$$\begin{aligned}\text{Financial perspective materiality} &= \frac{\text{Financial perspective mean}}{\sum \text{BSC-Perspectives means}} \\ &= \frac{3.47}{13.76} \\ &= 25.22\%\end{aligned}$$

This is applied to all items (see Table 8.11) to extract materiality in this study. Levels of agreement are classified as mentioned in Section 7.9.7. Based on this, the data related to BSC-perspectives and KPIs of BSC-perspectives is then analyzed as follows:

## 8.6 Data Analysis Related to BSC-Perspectives

The following table shows the mean, standard deviation, and materiality of the items related to BSC Perspectives for respondents in the commercial banks in Jordan.

Table 8.11: Descriptive statistics for respondents' answers related to BSC-perspectives

BSC-perspectives	Total of the items	Total mean	Standard deviation	Materiality	Levels of agreement
<b>Financial:</b> To what extent do the following indicators of AISs contribute to achieving better financial results?	32	3.47	0.332	25.22	<b>H</b>
<b>Customers:</b> To what extent do the following indicators of AISs contribute to meeting the needs and satisfaction of current and future customers?	16	2.24	0.305	16.27	<b>M</b>
<b>Internal business process:</b> To what extent do the following indicators of AISs contribute to the development of handling operations and service delivery?	18	3.00	0.354	21.80	<b>H</b>
<b>Learning and growth:</b> To what extent do the following indicators of AISs contribute in creating growth and improvements required to achieve goals?	22	2.70	0.304	19.62	<b>M</b>
<b>Internal control:</b> To what extent do the following indicators of accounting information systems contribute in the protection of money and raising the efficiency of performance?	26	2.35	0.347	17.08	<b>M</b>

Results shown in Table 8.11 indicate that the levels of agreement of respondents to the above items are positive, since their mean values are equal to or greater than the measurement tool's average (see Section 7.9.7.1 “One Sample T-Test”). Also, there is an indication that levels of responses towards BSC perspectives are high for the items related to financial and internal business process. For the items, customers, learning and growth, internal control, the level of answers were medium. In the mean value 2.24-3.47, the financial perspective was ranked the highest with a mean value of 3.47 and a standard deviation with 0.332 with materiality of 25.25%, while the customer perspective was ranked last with a mean value of 2.24 and standard deviation 0.305 and materiality of 16.23%. Generally, the mean value of the overall sample assessment regarding the BSC perspectives was 2.75, which corresponds to medium agreement with 54.96%, within the average hypothesized level of measurement 2-2.99 (see Section 9.7.9 “One Sample T-Test”). The total standard deviation was 0.328 indicating the harmony and convergence between answers and agreement regarding the validity of the questions. In the next section, the researcher discusses the analysis of data related to KPIs of BSC-perspectives.

## 8.7 Analysis of data related to KPIs of BSC-perspectives

### 8.7.1 Financial KPIs to improve AIS performance

Table 8.12: Shows mean, standard deviation, materiality for the items related to Financial KPIs for the target respondents as follows.

Table 8.12: Descriptive statistics for target respondents related to financial KPIs

Financial KPIs	Total of the items	Total mean	Standard deviation	Materiality	Levels of agreement
Business revenue	6	4.10	0.595	29.50	<b>VH</b>
Productivity growth	6	3.84	0.488	27.67	<b>H</b>
Exploitation of assets	9	2.38	0.594	17.13	<b>M</b>
Cash flow	8	3.57	0.551	25.70	<b>H</b>
<b>Total</b>	<b>32</b>	<b>3.47</b>	<b>0.332</b>	<b>25.25</b>	<b>H</b>

Results presented in Table 8.12 indicate that the respondents' levels of agreement to the Financial KPIs is positive, since their mean values are greater than the measurement tool's average except for exploitation of assets, which was within the average of the measurement tool. Business revenue was in the first degree in high level of agreement with mean value 4.1, standard deviation 0.595 and materiality 29.50%, which might indicate its importance to the study's sample in terms of management's role in setting controls for the bank's business revenue, which leads to an increase of AIS efficiency. Exploitation of assets came in the last position with a mean value of 2.38, standard deviation 0.594 and materiality 17.13%. Generally, the mean value for the overall financial KPIs in improving AIS performance was 3.47, which concurs with the high level of agreement 25.25% as shown in the materiality column. Standard deviation of answers was 0.332, which denotes the non-existence of discrepancies among individuals in their answers regarding the KPIs fields.

In the next sub-section, the researcher discusses the KPIs of financial factors (business revenue, productivity growth, exploitation of assets and cash flow) that have been used to improve AIS performance.

#### 8.7.1.1 AIS-KPIs to Increase of Business Revenue

The following table shows the mean, standard deviation, and materiality of the items related to Business Revenue of AIS-KPIs for respondents in the commercial banks in Jordan.

Table 8.13: Descriptive statistics for respondents' answers related to business revenue

<b>Business Revenue</b>	<b>Item No. in questionnaire</b>	<b>Total mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Agreement level</b>
The use of the available AIS to achieve results are higher than normal.	a1	4.14	0.848	16.84	<b>VH</b>
The use of AIS to determine factors that affect profitability and then improve these factors.	a2	4.01	0.862	16.31	<b>VH</b>
The use of Knowledge Management System to support strategic policies in dividing profits.	a3	4.15	0.848	16.89	<b>VH</b>
The use of Electronic Bulletin Boards in meeting rooms to provide strategic feedback and then to provide this to shareholders.	a4	4.09	0.908	16.64	<b>VH</b>
To continue updating the bank website and its security level using the Modern Organizational Structure policy.	a5	4.12	0.884	16.76	<b>VH</b>
The use of e-Commerce on the bank Website to provide services through the internet.	a6	4.07	0.971	16.56	<b>VH</b>
<b>Total</b>	<b>6</b>	<b>4.10</b>	<b>0.595</b>	<b>29.50</b>	<b>VH</b>

Results given in Table 8.13 indicate that business revenue indicators do have an important impact on AIS performance according to all answers to the items. The mean value for these items was 4.15 - 4.01, standard deviation 0.971 - 0.862 and materiality 16.89% - 16.31%, which confirms the similar relative importance of each item, to a great extent, for all indicators. Generally, the total mean value was 4.10, which denotes high level of impact, with materiality of 29.50%. The standard deviation of 0.595 indicates the agreement between individuals' answers to these items, which is in harmony with the overall answers to the items.

### **8.7.1.2 AIS-KPIs to achieve Productivity Growth**

The following table shows the mean, standard deviation, and materiality of the items related to Productivity Growth for respondents in the commercial banks in Jordan.

Table 8.14: Descriptive statistics for respondents' answers related to Productivity Growth

<b>Productivity Growth</b>	<b>Item No. in questionnaire</b>	<b>Total Mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Agreement level</b>
An AIS design that allows it to be flexible enough to achieve the desired results.	a7	3.66	0.924	10.57	<b>H</b>
The inclusion of the AIS in the process of continuous improvement.	a8	3.77	0.954	10.89	<b>H</b>
The aim of the continuous improvement of the AIS is to decrease costs and to increase the revenue.	a9	3.90	0.990	11.26	<b>H</b>
To put in place active procedures in order to achieve the highest revenue from the available value of resources.	a10	4.00	0.999	11.55	<b>VH</b>
To comply with different customer needs through the use of AIS.	a11	4.00	0.878	11.55	<b>VH</b>
The use of AIS that allows managers to solve financial problems.	a12	4.15	0.858	11.98	<b>VH</b>
The application of the Front-Office System (information receiving systems, decision support system, trade and currency exchange systems, investment management systems) in business operations .	a13	3.62	0.899	10.45	<b>H</b>
Preparing an e-budget to provide a long-term strategic plan in order to increase profit and decrease cost.	a14	3.80	0.844	10.98	<b>H</b>
The use of a Financial Information system to provide more accurate financial analysis and to increase productivity.	a15	3.73	0.879	10.77	<b>H</b>
<b>Total</b>	<b>9</b>	<b>3.84</b>	<b>0.488</b>	<b>27.67</b>	<b>H</b>

Results shown in Table 8.14 indicate that there is a high level of impact for Productivity Growth on AIS performance for all aspects related to the items a10, a11, and a12. Their mean value was 4.00 - 4.15, which corresponds to materiality level of 11.55% - 11.98% and standard deviation 0.858 - 0.999. The mean value for the rest of the items a7, a8, a9, a13, a14, a15 indicate a high level of impact, where the mean value range was 3.62 - 3.90, corresponding to materiality level of 10.45% - 10.98%. Generally, the productivity growth level was high, where the total mean value was 3.84, materiality 27.67%, standard deviation 0.488, which indicates agreement between answers to these items.

### **8.7.1.3 AIS-KPIs to achieve Exploitation of Assets**

The following Table shows the mean, standard deviation, and materiality of the items related to Exploitation of Assets for respondents in the commercial banks in Jordan.

Table 8.15: Descriptive statistics for respondents' answers related to Exploitation of Assets

Exploitation of Assets	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The use of AIS in order to improve the use of assets.	a16	2.22	0.569	10.37	M
To create new activities that use AIS in a more efficient way to use the available assets in the most efficient way possible.	a17	2.43	0.872	11.35	M
The improvement of the procedures of investment in bank capitals in order to increase productivity.	a18	2.44	0.931	11.40	M
The preparation of a Voice Response Unit to improve communication between employees.	a19	2.49	1.021	11.63	M
The application of a Global Accessible Interactive Website to link the bank with the international market.	a20	2.49	0.973	11.63	M
The use of an electronic communication system for research studies about customers.	a21	2.36	1.026	11.02	M
The application of a technical support unit to support the daily activities of internal departments.	a22	2.41	0.973	11.26	M
The application of an Anti-Money Laundering system to protect the national economy.	a23	2.42	0.949	11.30	M
The application of systems that contribute in activating the use of assets in bank departments.	a24	2.15	0.939	10.04	M
<b>Total</b>	<b>9</b>	<b>2.38</b>	<b>0.594</b>	<b>17.13</b>	<b>M</b>

Results presented in Table 8.15 indicate that Exploitation of Assets has an impact on AIS performance with medium level for answers to all items. The mean value of these items was 2.15 -2.49, with materiality 10.04% - 11.63% which confirms the equal significance of all of these indicators. However, standard deviation 0.569 - 1.026 indicates that there is a great discrepancy between answers. Generally, the total mean value was 2.38, which indicates medium level of impact, corresponding to materiality of 17.13%. The standard deviation 0.594 indicates the existence of greater agreement among individuals' views in the overall answers.

#### 8.7.1.4 AIS-KPIs to Increase and manage Cash Flows

The following table shows the mean, standard deviation, and materiality of the items related to Cash Flows for respondents in the commercial banks in Jordan.

Table 8.16: Descriptive statistics for respondents' answers related to Cash Flows

Cash Flows	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement Level
To use an effective AIS to increase and administrate future cash flow.	a25	2.83	0.959	11.15	<b>M</b>
To exert efforts to achieve a balance between futures' desired revenue and the performance of AIS.	a26	3.18	0.885	12.52	<b>H</b>
The proper use of AIS in order to measure the risks on the operating cash flows.	a27	3.18	0.913	12.52	<b>H</b>
To establish a plan to obtain financial funds and increase the working capital.	a28	3.32	0.995	13.08	<b>H</b>
The continuous effort in increasing the efficiency and ability of (ATMs).	a29	3.46	0.840	13.63	<b>H</b>
The application of electronic trading of securities on a world level.	a30	3.40	0.830	13.39	<b>H</b>
The use of Risk Management systems to face any financial risks.	a31	3.13	1.094	12.33	<b>H</b>
The application of Total Quality Management to achieve continuous improvement in order to attract and retain customers.	a32	2.89	0.685	11.38	<b>M</b>
<b>Total</b>	<b>8</b>	<b>3.57</b>	<b>0.551</b>	<b>25.70</b>	<b>H</b>

Results in Table 8.16: indicate that cash flows indicators have an impact on AIS performance with high level for answers to items a26, a27, a28, a29, a30, a31 where the mean value for these items ranged between 3.13 and 3.46, which corresponds to materiality 12.33% - 13.63%, and standard deviation 0.830 - 1.094 which shows discrepancies in these answers. The mean value of the items a25, a32 indicate a medium impact, corresponding to materiality of 11.15% - 11.38% with important discrepancy of standard deviation 0.685 – 0.959. Generally, the mean value of the total items was 3.57, materiality 25.70% and standard deviation 0.551, which indicates agreement between respondents' overall answers, unlike discrepancy of individual answers to these items.

In the next section, the researcher discusses the KPIs of customer service perspective to improve AIS performance.

## 8.7.2 Customer KPIs to improve AIS performance

Table 8.17 shows the mean values, standard deviation, and materiality for the items related to Customer KPIs of target respondents as follows.



Table 8.17: Descriptive statistics of target respondents related to measuring customer KPIs

Customer KPIs	Total of the Items	Total mean	Standard deviation	Materiality	Levels of agreement
Customer satisfaction	4	2.16	0.480	24.88	M
Reputation or goodwill	3	2.11	0.418	23.37	M
Service features	4	2.36	0.585	26.09	M
Attraction marketing	5	2.32	0.576	25.66	M
<b>Total</b>	<b>16</b>	<b>2.24</b>	<b>0.304</b>	<b>16.23</b>	<b>M</b>

Results in Table 8.17 indicate that levels of agreement of respondents are similar to the customer KPIs in all aspects, since their mean values are within the average of the measurement tool. Their level of agreement regarding the impact of customer KPIs on the efficiency of AIS at banks was medium. Service feature was in the first degree with a mean value 2.36, standard deviation 0.585 and materiality 26.09%. Attraction marketing came second, with a mean value of 2.32, standard deviation (0.576) and materiality 25.66%. Customer satisfaction came third, with a mean value of 2.16, standard deviation 0.480 and materiality 24.88%. Reputation or goodwill came in the last position, with a mean value of 2.11, standard deviation 0.418 and materiality 23.37%. Generally, the mean value for the target sample's assessment of customer KPIs in improving AIS performance was 2.24, which corresponds to medium level of agreement of 16.23%. Standard deviation of answers to that field was 0.304, which denotes the existence of agreement, to some extent, between individuals regarding the items in those fields in general. This could be because the respondents are concerned with those KPIs, and they are areas that need to be improved by bank management.

In the next sub-section, the researcher discusses the KPIs of customer service (customer satisfaction, reputation or goodwill, service features and attraction marketing) that have been used to improve AIS performance.

### 8.7.2.1 Using AIS-KPIs to Achieve Customer Satisfaction

The following table shows the mean, standard deviation, and materiality of the items related to Customer Satisfaction for respondents in the commercial banks in Jordan.

Table 8.18: Descriptive statistics for respondents' answers related to customer satisfaction

Customer Satisfaction	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The use of a Customer Satisfaction Survey through e-mail, vital for improving quality of service to discuss their suggestions and problems.	b1	2.25	0.974	26.07	M
The application of video communication to communicate with customers through video-conference to discuss their suggestions and problems.	b2	2.24	0.896	25.96	M
The use of home banking services to save time required to complete transactions.	b3	2.14	0.839	24.80	M
To provide more services to customers through mobile communication (Mobile Banking).	b4	2.00	0.771	23.17	M
<b>Total</b>	<b>4</b>	<b>2.16</b>	<b>0.480</b>	<b>24.88</b>	<b>M</b>

Results shown in Table 8.18 indicate that customer satisfaction indicators have an impact on AIS performance with medium level for answers to all items. The mean value for these items ranged between 2.00 - 2.25, with materiality ranging between 23.17% - 26.07%, which confirms convergence in significance, to some extent, of all of these indicators. The standard deviation 0.771 - 0.974 indicates the existence of discrepancy, to some extent, between answers. Generally, the total mean value was 2.16, which indicates a medium level of impact corresponding to materiality of 24.88%. The standard deviation 0.480 indicates the existence of a greater level of agreement among individuals in terms of the overall answers to the items.

### 8.7.2.2 Using AIS-KPIS to keep the Reputation or Goodwill

The following table shows the mean, standard deviation, and materiality of the items related to reputation or goodwill for respondents in the commercial banks in Jordan.

Table 8.19: Descriptive statistics for respondents' answers related to Reputation or Goodwill

Reputation or Goodwill	Item No. in questionnaire	Total Mean	Standard Deviation	Materiality	Agreement level
To realize the significance of AIS as a main factor to obtain a competitive advantage.	b5	2.11	0.611	33.23	M
The use of effective AIS in order to synchronize internal procedures with main objectives or strategies.	b6	2.18	0.712	34.33	M
To take into account the fair market share before designing the AIS for a bank.	b7	2.06	0.599	32.44	M
<b>Total</b>	<b>3</b>	<b>2.11</b>	<b>0.418</b>	<b>23.37</b>	<b>M</b>

Results given in Table 8.19 confirm that reputation or goodwill indicators have an impact on AIS performance with medium level for answers to all items. The mean value for these items ranged between 2.06 - 2.18, with materiality 32.37% - 34.33%, which confirms great convergence in the significance of these indicators. The standard deviation 0.611 – 0.599 indicates that there is a slight discrepancy between the answers. Generally, the total mean value was 2.11, which indicates a medium level of impact corresponding to materiality of 23.37%. The standard deviation 0.418 indicates a much greater extent of agreement among individuals' views in terms of overall responses to the items.

### 8.7.2.3 Using AIS-KPIS to develop Service Features

The following Table shows the mean, standard deviation, and materiality of the items related to Service Features for respondents in the commercial banks in Jordan.

Table 8.20: Descriptive statistics for respondents' answers related to Service Features

Service Features	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The application of a customer complaint system to provide communication re customer perception of bank.	b8	2.10	0.646	22.25	M
The application of the loan by phone service to customers without the need to enter a bank.	b9	2.34	0.728	24.79	M
To use the customer relationship management system to improve the relationship between the customers and the management of the banks.	b10	2.46	0.900	26.06	M
The use of camera equipped security systems.	b11	2.54	0.996	26.90	M
<b>Total</b>	<b>4</b>	<b>2.36</b>	<b>0.585</b>	<b>26.09</b>	<b>M</b>

Results shown in Table 8.20 indicate that service features' indicators have an impact on AIS performance with medium level for answers to all items. The mean value of these items ranged between 2.10 - 2.54, standard deviation 0.646 - 0.996 and materiality 22.25% - 26.90%, which confirms convergence, to some extent, for all these indicators. Generally, the total mean value was 2.36, which indicates a medium level of impact, corresponding to materiality of 26.09%. The standard deviation 0.585 indicates the existence of agreement and harmony among individuals' views in their answers to these items.

### 8.7.2.4 Using AIS-KPIs to Attract Marketing

The following table shows the mean, standard deviation, and materiality of the items related to Attraction Marketing for respondents in the commercial banks in Jordan.

Table 8.21: Descriptive statistics for respondents' answers related to attraction marketing

Attraction Marketing	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The application of an expansionary policy to satisfy all customer needs.	b12	2.35	0.971	20.26	M
The use of electronic means to provide services to customers such as (SMS services).	b13	2.36	0.927	20.34	M
The application of a database that categories customers according to their characteristics.	b14	2.38	0.971	20.52	M
To establish a team to study the procedures that could increase the organization's ability to attract and retain customers.	b15	2.28	0.923	19.66	M
The application of a database to keep record of customers to measure the bank's ability to retain loyal customers.	b16	2.23	0.786	19.22	M
<b>Total</b>	<b>5</b>	<b>2.32</b>	<b>0.576</b>	<b>25.66</b>	<b>M</b>

Results shown in Table 8.21 indicate that Attraction Marketing indicators have an impact on AIS performance with medium level for answers to all items. The mean value of these items ranged between 2.23 - 2.38, with materiality between 19.22% - 20.52%, which confirms the convergence of significance, to some extent, for all of these indicators. The standard deviation 0.786 - 0.971 indicates that there is discrepancy between answers. Generally, the total mean value was 2.32, which indicates a medium level of impact corresponding to materiality of 25.66%. The standard deviation 0.576 indicates the existence of a greater extent of agreement among individuals' views in their overall answers to the items.

In the next section, the researcher discusses the KPIs of internal business process perspective to improve AIS performance.

### 8.7.3 KPIs of Internal Business Process to improve AIS performance

Table 8.22 shows the mean values, standard deviation and materiality of the items related to Internal Business Process KPIs of the target respondents as follows.

Table 8.22: Descriptive statistics of the target respondents related to measuring Internal Business Process KPIs.

Internal business process KPIs	Total of the items	Total Mean	Standard deviation	Materiality	Levels of agreement
Strategic planning	4	3.67	0.734	30.41	H
Transaction processing	5	2.23	0.491	18.61	M
Emerging technologies	5	3.92	0.785	32.73	H
Legislation	4	2.19	0.454	18.25	M
<b>Total</b>	<b>18</b>	<b>3.00</b>	<b>0.354</b>	<b>21.83</b>	<b>H</b>

Results presented in Table 8.22 indicate the respondents' positive levels of agreement to all aspects of the internal business process KPIs, since their mean values are greater or within the average of measurement tool. Their levels of agreement regarding the impact of those KPIs on AIS are high in the fields of strategic planning and emerging technologies, while it is medium in the fields of transaction processing and legislation. Emerging technologies came in the first position with a mean value of 3.92, standard deviation 0.785 and materiality 32.73%. Strategic planning came in the second position, with a mean value of 3.67, standard deviation 0.734 and materiality 30.41%. Transaction processing came in the third position, with a mean value of 2.23, standard deviation 0.491 and materiality of 18.61%, while strategic planning came in the last position, with a mean value of 2.19, standard deviation 0.454 and materiality of 18.25%. Generally, the mean value for the respondents' assessment of internal business process KPIs in improving AIS performance was 3.00, which corresponds to a high level of agreement of 21.83%. The standard deviation of answers in that field was 0.354. These results denote the necessity of providing controls and legislation that determine banks' actions. This is the approach being studied by the Jordanian government in light of applying a financial and administrative reform program, which it is hoped, will have a positive impact on the total efficiency of the banking sector.

In the next sub-section, the researcher discusses the KPIs of Internal Business Process (strategic planning, transaction processing, emerging technologies and legislation) that have been used to improve AIS performance.

### 8.7.3.1 Using AIS-KPIs to improve Strategic Planning

The following table shows the mean, standard deviation, and materiality of the items related to Strategic Planning for respondents in the commercial banks in Jordan.

Table 8.23: Descriptive statistics for respondents' answers related to strategic planning

<b>Strategic Planning</b>	<b>Item No. in questionnaire</b>	<b>Total mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Agreement level</b>
The application of a strategic AIS to achieve determined objectives.	c1	3.30	0.962	22.45	<b>H</b>
To prepare an annual electronic financial statement to obtain vital information for future predictions.	c2	3.63	0.969	24.69	<b>H</b>
To initiate the measurement of performance with the initiatives and the overall strategy.	c3	3.91	0.951	26.60	<b>H</b>
To establish an appropriate plan to use the AIS in implementing the Balanced Score Card.	c4	3.86	0.973	26.26	<b>H</b>
<b>Total</b>	<b>4</b>	<b>3.67</b>	<b>0.734</b>	<b>30.41</b>	<b>H</b>

Results in Table 8.23 indicate that strategic planning indicators have a high level of impact on AIS performance, where the mean value of these items ranged between 3.30 - 3.91, standard deviation 0.951 - 0.973, relatively convergent to all items in discrepancy. Generally, the total impact level was high, where the mean value for the total items related to these indicators was 3.75, materiality 30.41% and standard deviation 0.734, which indicates a relative discrepancy of views towards these items.

### 8.7.3.2 Using AIS-KPIs to improve Transaction Processing

The following table shows the mean, standard deviation, and materiality of the items related to Transaction Processing for respondents in the commercial banks in Jordan.

Table 8.24: Descriptive statistics for respondents' answers related to Transaction Processing

<b>Transaction Processing</b>	<b>Item No. in questionnaire</b>	<b>Total mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Agreement level</b>
The application of the Electronic Document Systems to facilitate processes.	c5	2.18	0.824	19.57	<b>M</b>
The use of communication systems to improve internal processes.	c6	2.10	0.700	18.85	<b>M</b>
The use of a Credit Scoring Model to record credit loans.	c7	2.13	0.682	19.12	<b>M</b>
The use of an electronic file transfer program to transfer files within the internal network of the bank.	c8	2.37	0.935	21.28	<b>M</b>
The application of an electronic data interchanges to exchange data with different branches.	c9	2.36	0.997	21.18	<b>M</b>
<b>Total</b>	<b>5</b>	<b>2.23</b>	<b>0.491</b>	<b>18.61</b>	<b>M</b>

Results shown in Table 8.24, indicate that transaction processing has a medium level of impact on AIS performance, where the mean value of these items ranges between 2.10 - 2.37, standard deviation 0.682 - 997 and materiality of 18.85% - 21.28%, which confirms convergence, to some extent, in the significance of all these indicators. Generally, the mean value was 2.23, which indicates a medium level of impact, corresponding to materiality of 18.61%. The standard deviation 0.491 indicates the existence of high level of agreement and harmony among individuals' levels of agreement regarding the items.

### 8.7.3.3 AIS-KPIs to encourage Emerging Technologies

The following table shows the mean, standard deviation, and materiality of the items related to Emerging Technologies for respondents in the commercial banks in Jordan.

Table 8.25: Descriptive statistics for respondents' answers related to Emerging Technologies

Emerging Technologies	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
To continuously update the technology used in processing transactions.	c10	4.06	0.857	20.71	<b>VH</b>
To use modern ways of communication to improve communications between employees.	c11	3.88	0.971	19.80	<b>H</b>
To study the main requirements of the AIS.	c12	4.04	0.875	20.61	<b>VH</b>
To study the secondary requirements of the AIS.	c13	3.90	1.023	19.90	<b>H</b>
To provide an AIS capable of providing accurate and precise results.	c14	3.72	0.992	18.98	<b>H</b>
<b>Total</b>	<b>5</b>	<b>3.92</b>	<b>0.785</b>	<b>32.73</b>	<b>H</b>

Results shown in Table 8.25 indicate that emerging technologies have a very high level of impact on AIS performance in the items c10, c12, where the mean value for these items ranged between 4.04 - 4.06 corresponding to materiality of 20.61% - 20.71%, and standard deviation 0.857 - 0.875 which indicates discrepancy in answers. The mean value for the other items (c11, c13, and c14) indicates a high level of impact, corresponding to materiality ranging between 18.98% - 19.90% and notable discrepancy in standard deviation 0.971 - 1.023. Generally, the mean value for the total items was 3.92, with materiality of 32.73%, standard deviation 0.785 which indicates a relative discrepancy in views towards the total answers similar to the discrepancies in the individual answers to these items.

### 8.7.3.4 AIS-KPIs help to apply Legislation

The following table shows the mean, standard deviation, and materiality of the items related to Legislation for respondents in the commercial banks in Jordan.

Table 8.26: Descriptive statistics for respondents' answers related to legislation

Legislation	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
To activate the legislations of the AIS in banks.	c15	2.65	0.883	30.32	<b>M</b>
To maintain updated legislations.	c16	2.58	0.924	29.52	<b>M</b>
To unify the legislations of the AIS with the rest of the used legislations.	c17	1.52	0.771	17.39	<b>L</b>
To provide legislation that is flexible and useful to the information system.	c18	1.99	0.594	22.77	<b>L</b>
<b>Total</b>	<b>4</b>	<b>2.19</b>	<b>0.454</b>	<b>18.25</b>	<b>M</b>

Results shown in Table 8.26 indicate that legislation indicators have a medium level of impact on AIS performance in the items c15, c16, where mean value was 2.65, 2.58, materiality 30.32%, 29.52%, standard deviation 0.883, 0.924 consequently. Less indicators revealed in the items c17, c18, where the mean value was 1.52, 1.99, materiality 17.39%, 22.77%, standard deviation 0.771, 0.594 consequently. Generally, the total mean value was 2.19, which indicates a medium level of impact, corresponding to materiality of 18.25%. standard deviation 0.454 indicates the existence of relatively greater agreement among individuals regarding their overall levels of agreement to the items.

In the next section, the researcher discusses the KPIs of learning and growth to improve AIS performance.

### 8.7.4 Learning and growth KPIs to improve AIS performance

Table 8.27 shows the mean values, standard deviation and materiality of the items related to Learning and Growth KPIs of the target respondents as follows.



Table 8.27: Descriptive statistics of the target respondents related to measuring learning and growth KPIs.

<b>Learning and Growth KPIs</b>	<b>Total of the items</b>	<b>Total mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Levels of agreement</b>
Job satisfaction	5	2.80	0.536	25.92	<b>M</b>
Innovation and novelty	6	2.85	0.475	26.45	<b>M</b>
Training and skill	4	2.95	0.464	27.32	<b>M</b>
Knowledge flow	7	2.19	0.417	20.31	<b>M</b>
<b>Total</b>	<b>22</b>	<b>2.70</b>	<b>0.304</b>	<b>19.58</b>	<b>M</b>

Results shown in Table 8.27 indicate that the levels of agreement of respondents is positive toward the Learning and Growth KPIs, but their mean values are within the average of the measurement tool, and medium level of agreement for all KPIs. Training and skill came in the first position, with a mean value of 2.95, standard deviation 0.464 and materiality 27.32%. Knowledge flow came in the last position among KPIs fields, with a mean value of 2.19, standard deviation 0.417 and materiality 20.31%. Generally, the mean value for the respondents' assessment regarding learning and growth KPIs in improving AIS performance was 2.70, which corresponds to a medium level of agreement of 19.58%. The standard deviation of answers in that field was 0.304. This denotes the non-existence of discrepancies and the existence of, to some extent, consensus among individuals in their responses to items in this field. This also denotes the significance of the role that KPIs play in the overall activities of commercial banks in Jordan.

In the next sub-section, the researcher discusses the KPIs of learning and growth (job satisfaction, innovation and novelty, training and skill and knowledge flow) that have been used to improve AIS performance.

### 8.7.4.1 AIS-KPIs to achieve Job Satisfaction

The following table shows the mean, standard deviation, and materiality of the items related to Job Satisfaction for respondents in the commercial banks in Jordan.

Table 8.28: Descriptive statistics for respondents' answers related to job satisfaction

<b>Job Satisfaction</b>	<b>Item No. in questionnaire</b>	<b>Total mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Agreement level</b>
To use a code to provide the bank with the required information to manage and solve problems.	d1	3.18	0.841	22.73	<b>H</b>
To provide a place where employees can take a break and discuss workplace issues.	d2	2.82	0.920	20.16	<b>M</b>
To protect the employees in the field of AIS from overwork and fatigue.	d3	2.74	0.992	19.59	<b>M</b>
To adopt an objective system in the performance assessment of the employees.	d4	2.48	0.987	17.72	<b>M</b>
To promote the employees according to pre-determined standards.	d5	2.77	0.925	19.80	<b>M</b>
<b>Total</b>	<b>5</b>	<b>2.80</b>	<b>0.536</b>	<b>25.92</b>	<b>M</b>

Results presented in Table 8.28 indicate that Job Satisfaction indicators have a high level of impact on AIS performance in the item d1, with a mean value of 3.18, materiality 22.73% and a relatively varying standard deviation 0.841. The other items d2, d3, d4, d5 indicate that medium level of impact, where the Mean value for these items ranged between 2.48 - 2.82, standard deviation 0.920 - 0.992 and materiality of 17.72% - 20.16%. Generally, the total mean value was 2.80, which indicates a medium level of impact corresponding to Materiality of 25.92%. The standard deviation 0.536 indicates harmony in views towards the total answers, unlike the discrepancies in individual answers to these items.

### 8.7.4.2 AIS-KPIs to support Innovation and Novelty

The following table shows the mean, standard deviation, and materiality of the items related to Innovation and Novelty for respondents in the commercial banks in Jordan.

Table 8.29: Descriptive statistics for respondents' answers related to innovation and novelty

<b>Innovation and Novelty</b>	<b>Item No. in questionnaire</b>	<b>Total Mean</b>	<b>Standard Deviation</b>	<b>Materiality</b>	<b>Agreement Level</b>
To provide e-learning facilities within the bank to improve employee performance.	d6	3.15	0.942	18.4	<b>H</b>
To provide employees with passwords and usernames.	d7	2.19	0.939	12.79	<b>M</b>
To have the ability to correct errors and deviations automatically, Without the need to return to the Director.	d8	3.09	0.962	18.05	<b>H</b>
To assess the management techniques used in the workplace to increase time efficiency.	d9	3.05	1.010	17.82	<b>H</b>
To reflect the management measurements on the management style used in the workplace.	d10	2.32	0.956	13.55	<b>M</b>
Use of an ID card system for employees accessing the electronic service department.	d11	3.32	0.850	19.39	<b>H</b>
<b>Total</b>	<b>6</b>	<b>2.85</b>	<b>0.475</b>	<b>26.45</b>	<b>M</b>

Results given in Table 8.29, indicate that Innovation and Novelty indicators have a high level of impact on AIS performance in the items d6, d8, d9, d11, where the mean value ranges between 3.5 - 3.32, materiality 17.82% - 19.39% and standard deviation 0.850 - 1.010 which indicates discrepancy. Results also indicate medium level of impact on answers to items d7, d10, where the mean value 2.19, 2.32, materiality 12.79%, 13.55%, standard deviation 0.939, 0.956 consequently. Generally, the total mean value was 2.85, which indicates medium level of impact corresponding to Materiality of 26.45%. The standard deviation 0.454 indicates relatively greater agreement among individuals' views towards the total answers to the items.

#### **8.7.4.3 Training and Skills AIS-KPIs**

The following table shows the mean, standard deviation, and materiality of the items related to Training and Skills for respondents in the commercial banks in Jordan.

Table 8.30: Descriptive statistics for respondents' answers related to Training and Skills

<b>Training and Skills</b>	<b>Item No. in questionnaire</b>	<b>Total mean</b>	<b>Standard deviation</b>	<b>Materiality</b>	<b>Agreement level</b>
The use of electronic learning resources for training employees on how provide services.	d12	2.41	0.892	20.46	<b>M</b>
To provide systems specializing in detecting learning needs.	d13	3.36	0.824	28.52	<b>H</b>
To provide learning courses to employees to remain up to date with technological advancements.	d14	2.87	0.925	24.36	<b>M</b>
To assess the activities in the research and advancement fields	d15	3.14	0.925	26.66	<b>H</b>
<b>Total</b>	<b>4</b>	<b>2.95</b>	<b>0.464</b>	<b>27.32</b>	<b>M</b>

Results in Table 8.30, indicate that Training and Skills have a high level of impact on AIS performance in the items d13, d15, where the mean value was 3.36, 3.14, materiality 28.52%, 26.66% and standard deviation 0.824, 0.925 consequently. Also indicated is a medium level of impact on the items d12, d14, with mean value 2.41 - 2.87, materiality 20.46%, 24.36% and standard deviation 0.892, 0.925 respectively. Generally, the total mean value was 2.95, which indicates a medium level of impact, corresponding to materiality of 27.32%. The standard deviation 0.464 indicates the existence of greater agreement among individuals' overall views towards the items.

#### **8.7.4.4 AIS-KPIs to renew of Knowledge Flow**

The following table shows the mean, standard deviation, and materiality of the items related to Knowledge Flow for respondents in the commercial banks in Jordan.

Table 8.31: Descriptive statistics for respondents' answers related to knowledge flow

Knowledge flow	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The application of the empowerment concept to give employees the ability to share the responsibility.	d16	2.10	0.848	13.68	M
The application of an employees' suggestion system to allow employees to participate in the decision-making process.	d17	2.02	0.795	13.16	M
The application of the knowledge management system to improve/increase the employees' knowledge.	d18	2.05	0.770	13.36	M
To encourage the participation of beneficiaries in the development of their systems.	d19	2.09	0.776	13.62	M
The distribution of duties to the employees according to their fields and experience.	d20	2.09	0.857	13.62	M
The encouragement of employees by their employers to increase productivity.	d21	2.00	0.814	13.02	M
The encouragement of employees by their employers to increase creativity.	d22	3.00	1.080	19.54	M
<b>Total</b>	<b>7</b>	<b>2.19</b>	<b>0.417</b>	<b>20.31</b>	<b>M</b>

Results presented in Table 8.31, indicate that knowledge flow have a high level of impact on AIS performance in the items d22 with mean value of 3.00, materiality of 19.54% and a relatively high degree of discrepancy at 1.080. The other items d16, d17, d18, d19, d20, d21, results indicate medium level of impact with mean value ranging from 2.00 - 2.10), standard deviation (0.770 - 0.857 and materiality 13.2% - 13.68% which relatively had important convergence. Generally, the total mean value was 2.19 which indicates a medium level of impact, corresponding to materiality of 20.31%. The standard deviation 0.417 indicates a consensus of views towards the items, unlike the noticeable discrepancy evident in the individual answers to the items.

In the next section, the researcher will discuss the KPIs of internal control to improve AIS performance.

### 8.7.5 KPIs of Internal Control to improve AIS performance

Table 8.32 shows the mean values, standard deviation and materiality of the items related to Internal Control KPIs of the target respondents as follows.

Table 8.32: The descriptive statistics of the target respondents related to measuring internal control KPIs.

Internal Control KPIs	Total of the items	Total Mean	Standard Deviation	Materiality	Levels of agreement
Regulatory controls	8	2.47	0.468	26.30	<b>M</b>
Access controls	6	2.63	0.555	27.92	<b>M</b>
Processing operations	5	2.27	0.462	24.12	<b>M</b>
Control inputs and outputs	7	2.04	0.577	21.66	<b>M</b>
<b>Total</b>	<b>26</b>	<b>2.35</b>	<b>0.347</b>	<b>17.10</b>	<b>M</b>

Results shown in Table 8.32 indicate the study sample's positive levels of agreement to the above fields, since their mean values are within the average of the measurement tool, and the level of the sample's answers are in agreement for all KPIs. It also indicates their positive levels of agreement towards the above fields since their mean values are within the medium level of the measurement tool and the level of respondents' answers are medium for internal control KPIs in all KPIs fields. The mean value was between 2.04 - 2.63, where access controls came in the first position with a mean value of 2.63, standard deviation 0.555 and materiality 27.92%. Control inputs and outputs came in the last position, with a mean value of 2.04, standard deviation 0.577 which corresponds to a medium level of agreement with materiality of 21.66%. Generally, the mean value for target respondents' assessment of internal control KPIs in improving AIS performance was 2.35, which corresponds to a medium level of agreement of 17.10%. The standard deviation of answers in that field was 0.347. This denotes the harmony and convergence in answering the items and agreement regarding the validity of these KPIs.

In the next sub-section, the researcher discusses the KPIs of internal control (regulatory controls, access controls, processing operations and control inputs) that have been used to improve AIS performance.

#### 8.7.5.1 AIS-KPIs to improve Regulatory Controls

The following table shows the mean, standard deviation, and materiality of the items related to Regulatory Controls for respondents in the commercial banks in Jordan.

Table 8.33: Descriptive statistics for respondents' answers related to regulatory controls

Regulatory controls	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
To distribute the responsibilities of the Survey staff in the Department of Information Systems regarding their sectors only.	e1	2.91	0.934	14.69	M
Rotating employees in the Department of Information Systems.	e2	2.67	0.842	13.48	M
The limitation of access to original documents to control and data preparation personnel.	e3	2.62	0.995	13.22	M
The inclusion of a documenting system description.	e4	2.41	0.954	12.17	M
The documentation of control procedures for the system.	e5	2.61	0.921	13.18	M
The documentation of operating instructions.	e6	2.16	0.896	10.9	M
Limiting access to documentation to specialists only.	e7	2.16	0.899	10.9	M
The approval of all amendments.	e8	2.27	0.984	11.46	M
<b>Total</b>	<b>8</b>	<b>2.47</b>	<b>0.468</b>	<b>26.30</b>	<b>M</b>

Results shown in Table 8.33 indicate that regulatory controls have a medium level of impact on AIS performance in all items with mean values ranging from 2.16 - 2.91, materiality 10.9% - 14.69% which confirms the relative discrepancy, to some extent, in regards to the significance of all indicators. The standard deviation 0.842 - 0.995 indicates, to some extent, the existence of discrepancy between answers. Generally, the total standard deviation was 2.47, which indicates the existence of a medium level of impact, corresponding to materiality 26.30%. The standard deviation 0.468 indicates the existence of a greater degree of harmony among individuals' overall responses to the items.

#### 8.7.5.2 AIS-KPIs of Access controls

The following table shows the mean, standard deviation, and materiality of the items related to access controls for respondents in the commercial banks in Jordan.

Table 8.34: Descriptive statistics for respondents' answers related to access controls

Access controls	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The application of a policy that does not allow the use of any software on any but the company's programs.	e9	2.19	0.949	13.90	M
The selection of passwords specific to each user.	e10	2.16	0.912	13.71	M
The use of pin numbers to access the electronic service department.	e11	3.17	0.959	20.11	H
The protection of the system against viruses.	e12	2.30	0.921	14.59	M
The reviewing of reports of the use of equipment.	e13	3.08	0.943	19.55	H
The merging of files at appropriate intervals to re-establish files.	e14	2.86	0.923	18.14	M
<b>Total</b>	<b>6</b>	<b>2.63</b>	<b>0.555</b>	<b>27.92</b>	<b>M</b>

Results in Table 8.34, indicate that access controls have a high level of impact on AIS performance in the items e11, e13, with mean value of 3.13, 3.08, materiality 20.11% - 19.55%, and standard deviation 0.959, 0.923 respectively, which indicates discrepancy in answers to the items. Results also indicates the existence of medium level of impact in items e10, e12, e14, where the mean value ranged between 2.16 - 2.86, materiality 13.71% - 18.14% and standard deviation 0.939, 0.956. The standard deviation of 0.555 indicates the existence of relatively higher agreement among individuals' overall views towards items.

### 8.7.5.3 AIS-KPIs to improve Processing Operations

The following table shows the mean, standard deviation, and materiality of the items related to Processing Operations for respondents in the commercial banks in Jordan.

Table 8.35: Descriptive statistics for respondents' answers related to processing operations

Processing operations	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
The comparison of control collections of the input stage with control collections after treatment.	e15	2.91	1.047	25.62	M
The application of containment programs to review the comprehension.	e16	2.12	0.788	18.66	M
To undertake special actions to examine and correct the re-submission of rejected data.	e17	2.08	0.783	18.31	M
To keep a record of mistakes during the treatment process.	e18	2.13	0.775	18.75	M
To design special programs to detect files that has been updated and are linked to the data.	e19	2.12	0.795	18.66	M
<b>Total</b>	<b>5</b>	<b>2.27</b>	<b>0.462</b>	<b>24.12</b>	<b>M</b>



Results presented in Table 8.35 indicate that processing operations have a medium level of impact on AIS performance in all items, where the mean value of these items ranged between (2.08 - 2.91), corresponding to materiality of 18.31% - 25.62%. This confirms some extent of convergence in significance for all indicators in e16, e17, e18, e19, where standard deviation ranged between 0.775 - 0.795, except for the item e15, which indicated a severe standard deviation of 1.047, corresponding to a higher percentage of materiality of 25.62%. Generally, the total mean value was 2.27, which corresponds to materiality of 24.12%. The standard deviation 0.462 indicates the existence of relatively high level of agreement and harmony among individuals' views towards answering these items.

#### 8.7.5.4 AIS-KPIs to improve Control Inputs

The following table shows the mean, standard deviation, and materiality of the items related to Control inputs and outputs for respondents in the commercial banks in Jordan.

Table 8.36: Descriptive statistics for respondents' answers related to control inputs

Control inputs and outputs	Item No. in questionnaire	Total mean	Standard deviation	Materiality	Agreement level
To create written procedures on how to set up data.	e20	2.00	0.817	13.92	M
To detail scrutiny of the data prior to entry.	e21	2.01	0.811	13.98	M
The preparation of manual procedures to correct data entry errors during the detection phase.	e22	2.09	0.889	14.54	M
The matching of output totals with predicted output totals.	e23	2.13	0.779	14.82	M
To check numbers after printing documents with the numbers within the program.	e24	2.09	0.769	14.54	M
To design a program to detect any unauthorized attempt to print or copy outputs.	e25	2.00	0.802	13.93	M
To establish periodic reviews of the internal control system by the Department of Internal Auditing.	e26	2.05	0.797	14.27	M
<b>Total</b>	<b>7</b>	<b>2.04</b>	<b>0.577</b>	<b>21.66</b>	<b>M</b>

Results shown in Table 8.36 indicate that Control inputs and outputs have a medium level of impact on AIS performance in all items, where the mean value of these items ranged between 2.00 - 2.13, materiality ranged between (13.92% - 14.82%) and harmonized standard deviation 0.769 - 0.889. Generally, the total mean value was (2.04), which indicates medium level of impact, corresponding to materiality of 21.66%. The standard deviation 0.577 indicates the existence of greater agreement among individuals' views towards their answers to the total items.

In the next section, the researcher discusses the correlation coefficient analysis to reveal the important relationship between all the required elements of AIS-BSC.

## 8.8 Correlation coefficient analysis

The correlation theory reveals the extent of the relationship between two targeted elements, and indicates the level and trend of this relationship [368]. It is also important for detecting the ascertained relationship and defining its behavior, provided that this relationship is quantitative. Furthermore, this relationship should be linear and can be represented by a straight line describing the relationship between two aspects (direct, reverse), and its strength (strong, medium, weak, absent) and the strength of its relationship is between (+1, -1) and indication to intent (-, +) strength depends on magnitude, correlation describes the relationship without referring to negativity; indication (0) means the non-existence of relation between the two elements. Therefore, this type of descriptive statistic can increase our understanding of the causal relationships between the elements. For the purposes of this study, the Pearson correlation factor is the most appropriate correlation measure since it provides the simplest image for the mean value of the results of multiplying the standard relations upon conducting the pairwise tests matrix for two of its elements. Cohen [375] provides a guide in the interpretation of the strength of relationship between two variables as follows:

Table 8.37: Guides of evidence related to correlation strength

Correlation coefficient (r)	Strength of relationship
$r = 0.100$ to $0.199$ or $r = -0.100$ to $-0.199$	Small
$r = 0.200$ to $0.299$ or $r = -0.200$ to $-0.299$	Medium
$r = 0.300$ to $1.000$ or $r = -0.300$ to $-1.000$	Large

Guides were used to assess Cohen [375] after being amended to adapt to the results of guides' indicators of this study, bearing in mind that an explanation of correlation does not necessarily always follow a specific classification. Pearson correlation analysis was applied to the elements of this study (see the correlation coefficient Table in Appendix 2). Results are shown in the correlation matrices in the following tables.

Table 8.38: Pearson correlation matrix for BSC-perspectives

<b>BSC-Perspectives</b>	<b>F</b>	<b>C</b>	<b>IBP</b>	<b>L&amp;G</b>	<b>IC</b>
<b>F</b>	1.000	0.081	0.228	0.196	0.075
<b>C</b>		1.000	0.059	-0.026	0.182
<b>IBP</b>			1.000	0.318	0.161
<b>L&amp;G</b>				1.000	0.400
<b>IC</b>					1.000

\*\* Correlation is important at the 0.01 level.

\* Correlation is important at the 0.05 level.

Table 8.39: Pearson correlation matrix of F-perspective and F-KPIs

<b>F-perspective &amp; KPIs</b>	<b>F</b>	<b>KPI F-1</b>	<b>KPI F-2</b>	<b>KPI F-3</b>	<b>KPI F-4</b>
<b>F</b>	1.000	0.526	0.629	0.649	0.491
<b>KPI F-1</b>		1.000	0.328	0.014	-0.059
<b>KPI F-2</b>			1.000	0.265	0.005
<b>KPI F-3</b>				1.000	0.241
<b>KPI F-4</b>					1.000

Table 8.40: Pearson correlation matrix for C-perspective and C-KPIs

<b>C-Perspective &amp; KPIs</b>	<b>C</b>	<b>KPI C-1</b>	<b>KPI C-2</b>	<b>KPI C-3</b>	<b>KPI C-4</b>
<b>C</b>	1.000	0.503	0.516	0.646	0.593
<b>KPI C-1</b>		1.000	0.380	-0.067	-0.066
<b>KPI C-2</b>			1.000	0.151	0.098
<b>KPI C-3</b>				1.000	0.410
<b>KPI C-4</b>					1.000

Table 8.40: Pearson correlation matrix for IBP-Perspective and IBP-KPIs

<b>IBP-Perspective &amp; KPIs</b>	<b>KPI IBP</b>	<b>KPI IBP-1</b>	<b>KPI IBP-2</b>	<b>KPI IBP-3</b>	<b>KPI IBP-4</b>
<b>IBP</b>	1.000	0.645	0.474	0.536	0.489
<b>KPI IBP-1</b>		1.000	0.224	0.024	0.161
<b>KPI IBP-2</b>			1.000	-0.067	0.249
<b>KPI IBP-3</b>				1.000	0.037
<b>KPI IBP-4</b>					1.000

Table 8.41: Pearson correlation matrix for L&G-perspective and L&G-KPIs

<b>L&amp;G-Perspective &amp; KPIs</b>	<b>L&amp;G</b>	<b>KPI L&amp;G-1</b>	<b>KPI L&amp;G-2</b>	<b>KPI L&amp;G-3</b>	<b>KPI L&amp;G-4</b>
<b>L&amp;G</b>	1.000	0.619	0.704	0.552	0.659
<b>KPI L&amp;G-1</b>		1.000	0.258	0.029	0.262
<b>KPI L&amp;G-2</b>			1.000	0.294	0.322
<b>KPI L&amp;G-3</b>				1.000	0.168
<b>KPI L&amp;G-4</b>					1.000

Table 8.42: Pearson correlation matrix for IC-perspective & IC-KPIs

IC-Perspective & KPIs	IC	KPI IC-1	KPI IC-2	KPI IC-3	KPI IC-4
IC	1.000	0.628	0.744	0.557	0.664
KPI IC-1		1.000	0.475	0.193	0.157
KPI IC-2			1.000	0.220	0.288
KPI IC-3				1.000	0.203
KPI IC-4					1.000

To facilitate the explanation and classification of correlations in the above matrices, an abstract for these relations is given in Table 8.43 follows.

Table 8.43: Summary of the above matrices

Comparison between the BSC-items (BSC-perspectives and KPIs)	Correlation coefficient (r)	Level of Correlation coefficient(r)	Strength of relationship
F-perspective With C-perspective	0.081	-	Weak relationship
F-perspective With IBP-perspective	0.228	0.200 to 0.299	Medium relationship
F-perspective With L&G-perspective	0.196	0.100 to 0.199	Small relationship
F-perspective With IC-perspective	0.075	-	Weak relationship
C-perspective With IBP-perspective	0.059	-	Weak relationship
C-perspective With L&G-perspective	-0.026	-	Weak relationship
C-perspective With IC-perspective	0.182	0.100 to 0.199	Small relationship
IBP-perspective With L&G-perspective	0.318	0.300 to 1.000	Large relationship
IBP-perspective With IC-perspective	0.161	0.100 to 0.199	Small relationship
L&G-perspective With IC-perspective	0.400	0.300 to 1.000	Large relationship
F-perspective With KPI F-1	0.526	0.300 to 1.000	Large relationship
F-perspective With KPI F-2	0.629	0.300 to 1.000	Large relationship
F-perspective With KPI F-3	0.649	0.300 to 1.000	Large relationship
F-perspective With KPI F-4	0.491	0.300 to 1.000	Large relationship
KPI F-1 With KPI F-2	0.328	0.300 to 1.000	Large relationship
KPI F-1 With KPI F-3	0.014	-	Weak relationship
KPI F-1 With KPI F-4	-0.059	-	Weak relationship
KPI F-2 With KPI F-3	0.265	0.200 to 0.299	Medium relationship
KPI F-2 With KPI F-4	0.005	-	Weak relationship
KPI F-3 With KPI F-4	0.241	0.200 to 0.299	Medium relationship
C-perspective With KPI C-1	0.503	0.300 to 1.000	Large relationship
C-perspective With KPI C-2	0.516	0.300 to 1.000	Large relationship
C-perspective With KPI C-3	0.646	0.300 to 1.000	Large relationship
C-perspective With KPI C-4	0.593	0.300 to 1.000	Large relationship
KPI C-1 With KPI C-2	0.380	0.300 to 1.000	Large relationship
KPI C-1 With KPI C-3	-0.067	-	Weak relationship
KPI C-1 With KPI C-4	-0.066	-	Weak relationship
KPI C-2 With KPI C-3	0.151	0.100 to 0.199	Small relationship
KPI C-2 With KPI C-4	0.098	-	Weak relationship
KPI C-3 With KPI C-4	0.410	0.300 to 1.000	Large relationship
IBP-perspective With KPI IBP-1	0.645	0.300 to 1.000	Large relationship
IBP-perspective With KPI IBP-2	0.474	0.300 to 1.000	Large relationship
IBP-perspective With KPI IBP-3	0.536	0.300 to 1.000	Large relationship
IBP-perspective With KPI IBP-4	0.489	0.300 to 1.000	Large relationship
KPI IBP-1With KPI IBP-2	0.224	0.200 to 0.299	Medium relationship
KPI IBP-1With KPI IBP-3	0.024	-	Weak relationship
KPI IBP-1With KPI IBP-4	0.161	0.100 to 0.199	Small relationship
KPI IBP-2With I KPI BP-3	-0.067	-	Weak relationship

KPI IBP-2With KPI IBP-4	0.249	0.200 to 0.299	Medium relationship
KPI IBP-3With KPI IBP-4	0.037	-	Weak relationship
L&G-perspective With KPI L&G-1	0.619	0.300 to 1.000	Large relationship
L&G-perspective With KPI L&G-2	0.704	0.300 to 1.000	Large relationship
L&G-perspective With KPI L&G-3	0.552	0.300 to 1.000	Large relationship
L&G-perspective With KPI L&G-4	0.659	0.300 to 1.000	Large relationship
KPI L&G-1 With KPI L&G-2	0.258	0.200 to 0.299	Small relationship
KPI L&G-1 With KPI L&G-3	0.029	-	Weak relationship
KPI L&G-1 With KPI L&G-4	0.262	0.200 to 0.299	Medium relationship
KPI L&G-2 With KPI L&G-3	0.294	0.200 to 0.299	Medium relationship
KPI L&G-2 With KPI L&G-4	0.322	0.300 to 1.000	Large relationship
KPI L&G-3 With KPI L&G-4	0.168	0.100 to 0.199	Small relationship
IC-perspective With KPI IC-1	0.628	0.300 to 1.000	Large relationship
IC-perspective With KPI IC-2	0.744	0.300 to 1.000	Large relationship
IC-perspective With KPI IC-3	0.557	0.300 to 1.000	Large relationship
IC-perspective With KPI IC-4	0.664	0.300 to 1.000	Large relationship
KPI IC-1 With KPI IC-2	0.475	0.300 to 1.000	Large relationship
KPI IC-1 With IC-3	0.193	.100 to .199	Small relationship
KPI IC-1 With I KPI C-4	0.157	.100 to .199	Small relationship
KPI IC-2 With I KPI C-3	0.220	.200 to .299	Medium relationship
KPI IC-2 With I KPI C-4	0.288	.200 to .299	Medium relationship
I KPI C-3 With KPI IC-4	0.203	.200 to .299	Medium relationship

The matrices and the table above reveal the existence of variances in correlation factor values (Large, Medium, Small) between the elements of BSC-Perspectives. Also, there are variances when comparing them with KPIs-Perspectives, but these variances indicate the nature of the different relations among these elements which differ according to the difference of each element's function under comparison and the purpose of this comparison. This will require attention being paid to the multicollinearity of the general model of the study, as will be discussed in the next sub-section.

### 8.8.1 Detection of multicollinearity

To detect multicollinearity, the previous Pearson correlation matrix was used, in addition to the Variance Inflation Factor (VIF) to verify that the questions pertaining to each of the KPI indicators are valid only for them, with no interference between them. Also, that each group of indicators is directed towards achieving only one objective. The researcher selected the highest level of Pearson correlation from the comparisons conducted among the previous items, one for each group separately as shown in Table 8.44 below:

Table 8.44: Testing for multicollinearity

Items	The strongest relationship	Pearson Correlation matrix	Collinearity statistics VIF model
<b>BSC-Perspectives</b>	L&G and IC	0.400	1.190
<b>F-Perspectives &amp; KPIs</b>	F and F-3	0.649	1.728
<b>C-Perspectives &amp; KPIs</b>	C and C-3	0.646	1.716
<b>IBP -Perspectives &amp; KPIs</b>	IBP and IBP-1	0.645	1.712
<b>L&amp;G-Perspectives &amp; KPIs</b>	L&G and L&G-2	0.704	1.983
<b>IC-Perspectives &amp; KPIs</b>	IC and IC-2	0.744	2.240

The data presented in Table 8.44 indicate that the highest correlation value among the items was between IC-perspectives and KPIs, where the correlation factor was 0.744. Upon applying the Variance Inflation Factor (VIF), this revealed:

$$VIF = 1 / (r^2 - 1)$$

$$VIF = 1 / ((0.744)^2 - 1) = 2.240$$

Since the VIF value is 2.240 which is less than 5, this means the non-existence of interference between these elements, which reflects the strength of the study's model. Multicollinearity helps detects whether the item's ability could be analyzed by simulating SPSS program or not as been shown in table 8.44 [368].

After discussing the second phase, in the next section, the researcher discusses the final calculations outcomes "Phase three" as follows.

## 8.9 Final calculations outcomes "Phase three"

The aim of this phase is to arrive at the AIS-KPIs' weights by calculating the analyses results of AHP/ANP (quantitative data analysis "Phase one"). These KPI weights support the theoretical and mathematical/logical findings of previous studies, based on the researcher's analysis, taking into consideration the opinions of academics and banking specialists. Also, based on previous SPSS analyses results (quantitative (survey) data analysis "Phase two"), the applicable, practical rules of KPIs are expressed through the viewpoints of the respondents who are drawn from the staff of the commercial banks in Jordan, as in Figure 8.4 below:

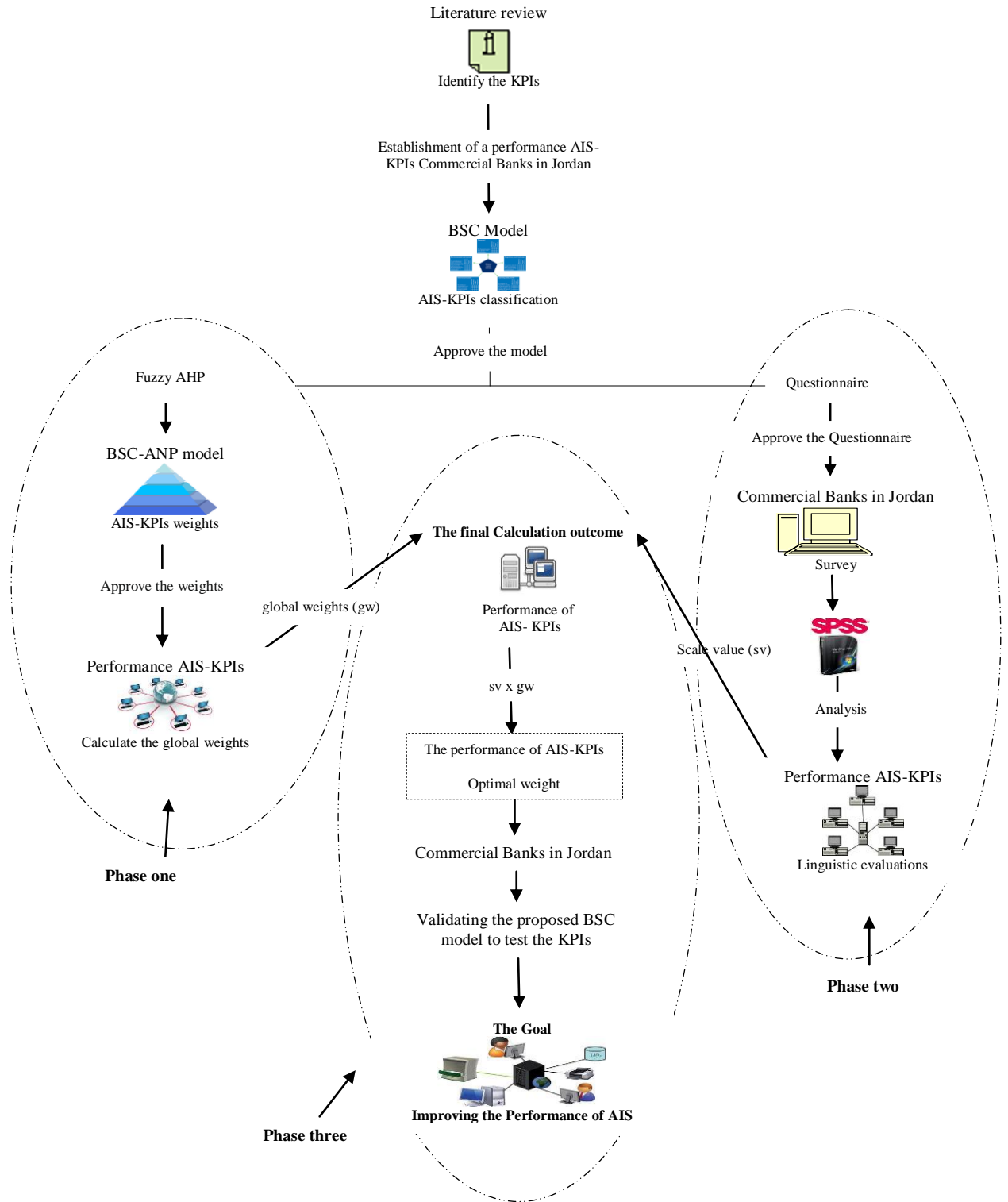


Figure 8.7: Calculations between ANP and SPSS

The purpose of calculations between the two analyses' processes is to use their combined characteristics to achieve the major goal of this study, which is to improve AIS performance in the commercial banks in Jordan through the theoretical and practical application of BSC. The two methods of calculation will lead to KPIs weights which will be used as criteria for AIS performance, which have been delivered via a fair and practical method by the respondents in the study sample. Thus, the researcher considered that the SPSS analyses' results are the bases of measurement for those KPIs, since they are related to the facts concerning the target society of the study.

Referring to the last step of the AHP/ANP process, it is noticed that the results from this phase are expressed numerically for each KPI and the alternative KPIs since these figures represent the alternative relative capacity to achieve the KPIs' goal, thus assisting with the selection of the best KPI for the most suitable choice of various KPIs. In respect of SPSS analysis, the Likert 5-point scale relies on responses that indicate the degree of agreement or materiality of each KPI, corresponding to its order among the compared KPIs. QI Lai-bin [376] emphasized that to address the shortcomings of the conventional statistic analytical method of Likert scale data, it should be used with fuzzy comprehensive evaluation in analysis to scale such as AHP/ANP. The two processes require the establishment of a suitable scale for both. Thus, the researcher used measurement performance indicators for the logic variables or levels of materiality [328]. The membership's functions of these Linguistic values or Levels of Agreement are shown in Figure 8.5 and the average values related to these variables are shown Table 8.45 below.

Table 8.45: Linguistic values and the mean of fuzzy numbers

Linguistic values	The mean of fuzzy numbers
Very high (VH)	1
High (H)	0.75
Medium (M)	0.5
Low (L)	0.25
Very low (VL)	0



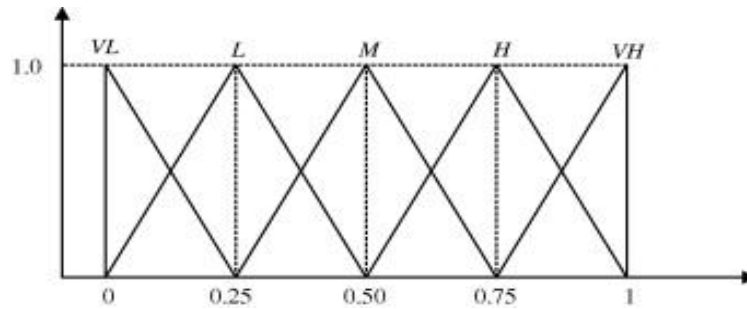


Figure 8.8: Membership functions of Linguistic values or Levels of Agreement for KPIs rating.

The previous measure expresses values that can be interpreted by using AHP/ANP analysis and a Likert scale, as shown in Table 8.46 below:

Table 8.46: Linguistic values or Levels of Agreement representations for mean of fuzzy numbers and Likert's scale set

Linguistic values (AHP/ANP analysis) (Table 8.45)	Likert's scale (SPSS analysis) (Table7.13)	Levels of agreement (SPSS analysis) (Table7.13)	The mean of fuzzy numbers (AHP/ANP analysis) (Table 8.45)
Very high (VH)	5	Strongly agree	1
High (H)	4	Agree	0.75
Medium (M)	3	Neither agree nor applicable	0.5
Low (L)	2	Disagree	0.25
Very low (VL)	1	Strongly disagree	0

The Likert 5-point scale adopts the levels 1, 2, 3, 4, 5 (the last column of Table 8.46 (Likert's scale)) and represents a scale of percentage, which collects the answers of respondents, while AHP/ANP analysis shows similar values (the third column of Table 8.46 - the mean of fuzzy numbers)). Measuring the AIS-KPIs enables us to determine common rules for the two analyses results (column one of Table 8.46 (Linguistic values or Levels of Agreement)).

To calculate scale value, Table 8.47 can be prepared in accordance with SPSS analysis by taking the materiality of KPIs (Tables 8.12, 8.13, 8.14, 8.15, and 8.16) which was already prepared based on the Likert 5-point scale analysis, with the level of materiality from Table 8.46. Also, these materiality levels can be given values as follows.

Table 8.47: Computed Scale value of AIS-KPIs

<b>AIS-KPIs</b>	<b>Materiality (Tables 8.12, 8.13, 8.14, 8.15, and 8.16)</b>	<b>Linguistic values or Levels of Agreement (Table 8.46)</b>	<b>Scale value (SV)</b>
F-1	29.50	VH	<b>1.00</b>
F-2	27.67	H	<b>0.75</b>
F-3	17.13	M	<b>0.50</b>
F-4	25.70	H	<b>0.75</b>
C-1	24.88	M	<b>0.50</b>
C-2	23.37	M	<b>0.50</b>
C-3	26.09	M	<b>0.50</b>
C-4	25.66	M	<b>0.50</b>
IBP-1	30.41	H	<b>0.75</b>
IBP-2	18.61	M	<b>0.50</b>
IBP-3	32.73	H	<b>0.75</b>
IBP-4	18.25	M	<b>0.50</b>
LG-1	25.92	M	<b>0.50</b>
LG-2	26.45	M	<b>0.50</b>
LG-3	27.32	M	<b>0.50</b>
LG-4	20.31	M	<b>0.50</b>
IC-1	26.30	M	<b>0.50</b>
IC-2	27.92	M	<b>0.50</b>
IC-3	24.12	M	<b>0.50</b>
IC-4	21.66	M	<b>0.50</b>

Results shown in Table 8.47 represent the Scale value of KPIs, and enable us to obtain the optimal AIS- KPIs' performance weight as in the following table:

Table 8.48: The optimal AIS- KPIs' performance weight by using the proposed BSC model

<b>KPIs</b>	<b>Global weights (gw)</b> (Table 8.8)	<b>Scale value (SV)</b> (Table 8.47)	<b>AIS- KPIs Optimal weight</b> (gw x sv)
F-1	0.106	1.00	<b>0.106</b>
F-2	0.081	0.75	<b>0.061</b>
F-3	0.036	0.50	<b>0.018</b>
F-4	0.056	0.75	<b>0.042</b>
C-1	0.020	0.50	<b>0.010</b>
C-2	0.023	0.50	<b>0.012</b>
C-3	0.027	0.50	<b>0.014</b>
C-4	0.019	0.50	<b>0.010</b>
IBP-1	0.082	0.75	<b>0.062</b>
IBP-2	0.038	0.50	<b>0.019</b>
IBP-3	0.074	0.75	<b>0.056</b>
IBP-4	0.046	0.50	<b>0.023</b>
LG-1	0.059	0.50	<b>0.030</b>
LG-2	0.059	0.50	<b>0.030</b>
LG-3	0.059	0.50	<b>0.030</b>
LG-4	0.042	0.50	<b>0.021</b>
IC-1	0.043	0.50	<b>0.022</b>
IC-2	0.043	0.50	<b>0.022</b>
IC-3	0.043	0.50	<b>0.022</b>
IC-4	0.043	0.50	<b>0.022</b>

To calculate the optimal AIS-KPIs performance weight, the Scale value is adopted as a basic measurement for comparison. Each global weight (GW) in the first column, which represents the results of AHP/ANP analysis for KPIs, is multiplied by its opposite Scale value (in the second column of the previous table) representing the SPSS analyses' results. Using this method to calculate the results of the two analyses would not only give the total degree of agreement of KPIs, but would also obtain the clear position of the respondents regarding the KPIs [376]. These new values (weight) of KPIs become the basic criteria for improving the performance of AIS-KPIs in the commercial banks in Jordan in the future.

The following section will highlight the main goals according to the results presented in the previous discussion.

### **8.9.1 Highlight the main goal**

The above table reveals that the KPIs were selected so that it becomes obvious to both bank management and staff which improvements in AIS performance occurred (performance strengths) and where more improvement can be achieved (performance weaknesses). All this

becomes available by utilizing the information provided, which supports and enhances bank staff's levels of agreement towards constant development and improvement of AIS performance. This can be achieved by improving the KPIs related to a bank's strategies and correlates them closely with the required objectives where the vision becomes obvious to all bank staff, unifying their efforts in achieving a clear strategy and specific objectives to improve the bank's overall performance. In a dynamic business environment, it is important that the performance of KPIs is aligned with bank strategies so that both small and great changes in the environment can be accommodated and adapted to successfully. In order to compare AIS performance in banks or business organizations according to KPIs, a BSC should be applied to AIS performance as a preliminary assessment step. Then the assessment process can be improved by integrating the BSC with AIS, where BSC outputs become the inputs to compare AIS-KPIs (comparison standards), and where best performance indicators are the basis for comparison or the reference for other AIS performance indicators. Finally, it can be said that the optimal AIS- KPIs performance weight (Table 8.47) represents the best performance level for AIS that is possible given the usual circumstances inside or outside the banks. These values provide guidelines for performance. Usually, performance KPIs within a bank's normal circumstances are of two types:

1. Ideal KPIs: Represent the best AIS performance in light of best expected circumstances, i.e. damage or loss of information.
2. KPIs can be achieved: Represent good level of AIS performance, which considers bank capacities and available potentials, where normal information damage or loss is allowed.

KPIs' relationship with AIS performance in the commercial banks in Jordan will be discussed in detail for all BSC aspects later when discussing the results of the study data analysis in the next chapter.

## 8.10 Conclusion

In this chapter, the researcher discussed the mechanism of the study's methodology applied in Chapter 7. The methodology was developed based mainly on the BSC, its steps and procedures being already prepared in an applied method in order to reach the multi-integrated objectives which should be achieved by the Jordanian commercial banks' AIS. The BSC was used basically to translate the AIS mission and strategy into organized objectives and scales for the financial, client, internal business processes, growth and education, and internal control perspectives. Then, the study presented the background of the BSC and the developments accompanying the general objective, the strategies prepared to achieve it through BSC perspectives, and how they were prepared and analyzed. Also, the study addressed the core and substance of the AIS improvement method, and showed how to link its elements with BSC and combine field information in order to arrive at a BSC-AIS.

Moreover, all BSC-AIS elements were analyzed in terms of their effect on the execution of work strategies and levels of agreements and the basic performance measuring systems using AHP/ANP. The researcher also tested BSC-AIS in the field using participants' responses to a questionnaire that focused on basic performance improvement stimulants AIS-KPIs, and analyzing the questionnaire's results using the SPSS program. Then, each element was analyzed according to each of the five perspectives. Finally, the results of SPSS and AHP/ANP analysis were combined in order to obtain final KPIs to be adopted as basic criteria against which to compare actual and expected future AIS performance. The next chapter will discuss the results of these elements in light of their already-established objectives. It is intended that all business organizations realize that the BSC is a merging of modern, intellectual and methodological elements in order to improve AIS performance, and provides a supporting organizational framework for the constant improvement of modern business organizations, specifically banks. In the next chapter, the researcher discusses the study findings presented in this chapter and provides recommendations accordingly.

## **Chapter 9 -**

# **Verification from the Study Findings and the Recommendations**

### **9.1 Introduction**

The aim of this chapter is to verify the results reached upon analyzing data of Chapter 8. In Sections 9.3-9.7, each KPI is verified and its role and significance in improving AIS performance in the commercial banks in Jordan is determined. In Section 9.8, BSC-Perspectives are verified in accordance with their classified AIS-KPIs, in addition to verifying objectives achieved by BSC-Perspectives to improve AIS performance in the commercial banks in Jordan. This chapter also aims to provide meaningful recommendations in Section 9.9 to commercial banks in Jordan arrived at by the researcher through this study.

### **9.2 Verification from KPIs and BSC perspectives**

The KPIs' technique of achieving business organizations' goal and strategies starts at the base of the hierarchy and ends at its summit. That is, it starts with little plans and tasks and ends with achieving the main goal. Similarly, this notion applies to the subject of this study, where commercial banks in Jordan start achieving their goal and strategies with an appropriate application of AIS-KPIs, which are the foundation of its hierarchy. Thus, the researcher recognizes the significance of verifying the findings of this study. For the base or foundation level of the hierarchy, 20 main KPIs have been determined and classified based on five perspectives (financial, customers, internal business process, learning and growth, internal control) (Figure 8.2). The aim of this chapter is to verify the study findings by focusing on these main KPIs and perspectives, which will be discussed in this chapter forthwith (Table 9.1).

Table 9.1: BSC-perspectives and KPIs

<b>BSC-perspectives</b>	<b>KPIs</b>
Financial	Business revenue
	Productivity growth
	Exploitation of assets
	Cash flow
Customer	Customer satisfaction
	Reputation or goodwill
	Service features
	Attraction marketing
Internal business process	Strategic planning
	Transaction processing
	Emerging technologies
	Legislation
Learning and growth	Job satisfaction
	Innovation and novelty
	Training and skills
	Knowledge flow
Internal control	Regulatory controls
	Access controls
	Processing operations
	Control inputs and outputs

Table 9.2: Ranking the drafting positions by level of importance

<b>Linguistic values</b>	<b>Position of Importance</b>
Very high (VH)	first Position
High (H)	second position
Medium (M)	third position
Low (L)	fourth position

To facilitate verification of identity KPIs base on study findings' analysis, position of importance (rank) will be given to each linguistic value defined in table (8.46) in the previous chapter. Based on that, linguistic values will be arranged according to the degree of significance where (VH) will be given for Very High and First Position, while (H) will be given for High and Second Position, (M) for Medium and Third Position, and (L) for Low and Fourth Position, as shown in Table 9.2. The following sections will identify BSC perspectives -KPIs of AIS-BSC according to the results presented in Tables 8.47 and 8.48 in Section 8.9.

### 9.3 Verification from Financial KPIs based on the study findings analysis

The Financial KPIs will be verified according to the study findings analysis as follows:

Table 9.3: Ranking the drafting positions of Financial KPIs

Financial-KPIs	Position of Importance
Business revenue	first Position
Productivity growth	second position
Exploitation of assets	fourth position
Cash flow	third position

#### 9.3.1 Business revenue

The results of the business revenue analysis revealed that this KPI is the most important financial perspective in AIS performance development, since it came in the first position (very high level) with materiality of 29.50% (Table 8.47) and optimal performance weight 0.106% (Table 8.48). This indicates the need for a clear and developed strategy to manage and handle AIS inside the bank. This aspect became more insistent and demanding than ever, since it gives an accurate and integrated image to the results of the historical financial image, in order to achieve better economic success. The target sample of the study believes that it has become necessary to use systems that support this aspect and lead to increasing profits and revenues. It will also contribute to producing decisions regarding the distribution of profits, provide better feedback to the shareholders, and increase the volume of banking operations which improves business revenue. Also, it will increase the capabilities of websites through constant development and updating.

#### 9.3.2 Productivity growth

This KPI came in the second position (high level) with materiality of 27.67% and optimal performance weight of 0.061%, which indicates the contribution of productivity growth in bank's convergence to a better cost practice (cost efficiency) for the same variables and the same circumstances. This indicates that the bank with cost efficiency is the one which uses systems that decrease cost, or the one which uses productive techniques and technologies that work at a minimum cost. Relatively small deviations in costs can be outside the range of bank's control (usually due to the random effects of good or bad circumstances that lead to



small deviations). Major deviations from optimal cost are more likely to indicate the inefficiency of management or its weakness in monitoring and controlling cost. It also indicates the decrease of planning level for production inputs provided by the bank, which decreases productivity growth, where bank's inputs become higher than the minimum level required to produce lower cost outputs which result in levels of inefficiency that contribute to increasing risk and decreasing a bank's performance averages. The target sample believes that this has to be avoided by designing an AIS that has enough flexibility to achieve the objectives, and improve the previous ones in order to achieve a real decrease in cost and generate as much value as possible. This is in addition to fulfilling the higher level of clients' various needs, and contributing to solving managers' problems by increasing the accuracy of financial analysis. Also, results need to be reviewed by users in order to establish routine decisions regarding the daily transactions that constitute the major part of banking work.

### **9.3.3 Exploitation of assets**

Results revealed that exploitation of assets has a medium level of materiality at 17.13% with optimal performance weight of 0.018%, placing this KPI came in the fourth and last position. This KPI measures the efficiency of banking management in using AIS to make best use of the bank's available assets. This study emphasizes the indicators that increase Return on Assets (ROA), which is important in motivating management to use the available resources efficiently, and increase its ability to bring in revenue from the available monies through various financing resources, regardless of the financing method. Thus, it reflects the effect of bank's operational and financing activities, since it underlies the bank's capacity to provide systems that contribute to increasing revenues, regardless of sources or the value of these revenues, represented in property rights, deposits and any other resources, which represent in total the bank's assets and liabilities. These systems can measure the effect of the bank's operational, financing and investment activities, and display the profits generated by each Jordanian Dinar of the assets, and increase the indicators of management efficiency when designing its future policies in this regard. This aspect seems important in enhancing ROA as a criterion for the bank's performance. The study respondents believe that it is necessary to use systems that aim to improve the use of assets, with emphasis on innovative new functions for AIS with greater efficiency to make full use of assets. Also, it is necessary to support the bank with systems that expand their clients and accelerate the bank's activities, in addition to providing modern equipment to communicate with local markets' and business news.

### 9.3.4 Cash flow

This KPI came in the third position with a high level of materiality of 25.70% and optimal performance weight of 0.042%, which is a relatively important indication in decreasing risks resulting from surplus or deficit of cash. Its significance increased recently as a result of development in many financial transactions that necessitate fulfillment of related timely obligations, in addition to fluctuation in interest and exchange rates and changes in markets' traits and ongoing developments in technology. The study respondents believe that it is necessary to use systems that constantly examine whether cash is being managed with great efficiency, in order to decrease cash risk as much as possible, increase and sustain current and future cash flow, promote AIS capacity to forecast the required future financial return, and forecast future risks by using risk forecast systems. In addition, there is need for constant planning in order to obtain the required financing, increase capital, and expand the scope and quality of investment in the Jordanian banks.

## 9.4 Verification from Customers KPIs based on the study findings analysis

The Customers KPIs will be verified according to the study findings analysis as follows:

Table 9.4: Ranking the drafting positions of Customers KPIs

Customers-KPIs	Position of Importance
Customer satisfaction	third position
Reputation or goodwill	fourth position
Service features	first position
Attraction marketing	second position

### 9.4.1 Customer satisfaction

Results of analyses related to customer satisfaction revealed its significance in AIS development, since it came in the third position (medium level of importance) with materiality at 24.88% and optimal performance weight at 0.010%. This indicates the need for a strategy that provides customers' with personal satisfaction with banking services and policies. The development of AIS is one of the most important challenges facing contemporary business organizations in light of Jordanian banks' increased focus on

fulfilling their customers' requirements as a means of ensuring their (banks') continued viability and survival. Jordanian banks have also made their staff more aware that providing quality of service is an important means of ensuring customer satisfaction, and customer satisfaction is one of the banks' objectives. Despite the efforts of many researchers to know the effect on AIS of changing the bank's strategy, results were mostly fuzzy and conflicting, because they focused on trying to limit the effects consequent to adopting the new strategy, without determining its effect on AIS. This leads to an unclear view of the perspectives and instruments that should be developed to ensure the success of that strategy. On the other hand, the ambiguity of the mechanism of analyzing clients' opinions and tendencies and the difficulty of determining and measuring them, induced the researcher to attempt identifying that mechanism as a starting point. This was to determine the effects of adopting a new strategy guaranteeing a framework that offers effective trends and instruments for development. The study sample respondents believe that adopting systems that guarantee a strategy to fulfill clients' trends, such as communicating with them through modern video and internet, and providing AIS to conduct surveys regarding customer satisfaction, is necessary to know their views and levels of agreements towards bank services. This can be achieved by conducting an e-survey to determine the level of customer satisfaction by sending e-mails, or using new technologies, such as home banking, which could improve their level of satisfaction. The strengths and weaknesses of a bank's performance can be ascertained by seeking customer feedback regarding previously provided services. On the other hand, surveys of customers' opinions and those of businessmen, society leaders, farmers, women, students, higher staff members, and public, would reveal their viewpoints. This would also add credibility to the service provided by the bank for a range of sectors in the society. Survey results might also provide statistical data required to support bank activities and other services.

#### **9.4.2 Reputation or goodwill**

Results of analyses related to reputation or goodwill came in the fourth position with materiality of 23.37% which is medium level, corresponding to optimal performance weight of 0.012%. This proves that the global developments in the money markets, technological, IT and e-commerce fields, should change their traditional role when showcasing a bank's reputation or goodwill. Also, it is no longer sufficient for banks to spend huge amounts without pre-determining the extent to which value will be added to their activities. Rather, banks should reconsider adopting systems that achieve fair market value, in order to enhance

the bank's reputation or goodwill that enables its continuity. Good reputation or goodwill usually increases business organizations' wealth; lack of these may lead to bankruptcy. Furthermore, recent studies in business strategy indicate that reputation or goodwill is of great value, and greatly assists business organizations to achieve better financial performance and secure their sustainability. Respondents believe that high sensitivity to, and accurate awareness of, customers' needs will elicit a favorable response from customers. These needs can be met by adopting new systems that assist in capturing a greater share of the market. High quality systems would help to establish good reputation, expand goodwill, minimize effort and time spent addressing any shortcomings in services provided to clients. On the other hand, banks can improve their reputation by making use of systems that improve their products, direct their clients to a brand that represents good quality which in generates greater goodwill. This means, making use of systems that provide the service or the bank with a better reputation than that of others.

### **9.4.3 Service features**

Service features came in the first position with materiality of 26.09% at medium level and optimal performance weight of 0.014%. This result indicates the significance of KPI, and that the major reason of it being used in banks is for the development of the quality concept, from final product quality to total quality. Apart from the emphasis on total quality, attention is paid to the quality of operations by controlling activities and attempting to eliminate or minimize any shortcomings in service provision. This subsequently produces the required quality, in addition to receiving inputs by service providers and anyone requiring. Also, it leads to the behavioral and professional development of staff members who deal directly with public, so that they are more aware of customers, can solve service-related problems, and provide services quickly and efficiently. The respondents believe that these issues require better and more consistent efforts to make improvements, and new instruments that are different from the traditional ones. Jordanian banks should realize the necessity of keeping up to date by adopting, for example, new methods of receiving customers' claims and suggestions, and methods related to loans and promoting better relationships between clients and the bank. Moreover, these systems should be accessible to boards of directors and committees, operations' management and executive management. Such systems should provide benefits to all and meet all their requirements for the purpose of improving performance and operations. Ultimately, this will be reflected in the quality of services and

products provided, and will subsequently improve the competitiveness of commercial banks in Jordan.

#### **9.4.4 Attraction marketing**

This KPI came in the second position with a medium level of materiality of 25.66% and optimal performance weight of 0.010%, which a relatively important indicator in attracting clients. It is important to develop accounting systems that reveal current and potential clients' needs and wishes, and translate them into the desired quality levels. It is necessary to adopt an intensive set of methods to activate the market, especially given the increasing burdens placed on the planners of sales campaigns. It has become necessary to plan such campaigns using a scientific approach, especially since current advertising and marketing trends in banking use tools that are superior to the traditional ones. Clients' service needs must be anticipated, and incentives such as special offers or gifts will encourage client loyalty. Respondents believe that providing an effective electronic documentation system that facilitates communication between the various levels and preparing a suitable reporting system would contribute to attracting clients. Also, policies should include the establishment of new branches and a database that categorizes clients; also, special teams could be formed with the responsibility of maintaining direct contact with clients and ascertaining their needs, especially in a competitive banking environment. Regardless of staff members' position, experience or salary, bank management should work consistently on training staff and reminding them that their first mission goal is to attract and satisfy clients, in addition to conducting intensive training courses on communication skills. To attract clients and maintain them, banks should have organized plans on how to achieve the maximum possible benefit of such efforts by deciding the suitable market and the suitable target society in order to obtain the highest possible return at the lowest possible cost.

### **9.5 Verification from Internal Business Process KPIs based on the study findings analysis**

The Internal Business Process KPIs will be verified according to the study findings analysis as follows:

Table 9.5: Ranking the drafting positions of Internal Business Process KPIs

Internal business process-KPIs	Position of Importance
Strategic planning	second position
Transaction processing	third position
Emerging technologies	first Position
Legislation	fourth position

### 9.5.1 Strategic planning

Results of strategic planning came in the second position with a high level of materiality of 30.41% and optimal performance weight of 0.062%. It might be worthwhile for the management personnel of Jordanian banks and financial institutions to understand the nature and outputs of the current Jordanian banking system, the integration of its various powers, and their impact on decision making. Effective strategic management requires systems that are practical and easy to implement; efficient planning by management; and programs that are designed to achieve specific, pre-defined objectives. Since planning is basically related to the future, forecasting is considered the essence of the operation; thus, a planner should have access to information that enables him to foresee future scenarios and plan possible future actions. In this framework, management should play a distinctive role in achieving the target performance levels. Respondents believe that if a bank's growth is hampered by a lack of basic resources necessary for an efficient AIS, then attention must be paid to the available devices, programs and staffs' capacity to use these systems, and effective recruitment methods. Hence, bank management plays a major role in directing and utilizing these systems for the purpose of effective strategic planning. If maximum use is to be made of these systems, then banks and financial institutions need to adopt a new management method with greater emphasis on the AIS as a source of knowledge necessary for economic development. Good AIS requires KPIs that readily make available the necessary analytic information which supports management's strategic planning policy, thereby improving management decisions in all banking fields. KPIs assist with the identification of any discrepancies in operations, and in the design and implementation of a control system that validates the strategic objectives. This leads to strategic performance systems, since they attempt to focus on implementing the strategic objectives at all levels of the business organization. Materiality analysis is used in order to select the best alternatives. Compare with an ideal competitor, in order to make the system as a motivation factor suitable and integrated with the modern strategic management methods. That includes the target cost and client's profitability analyses, etc. Also, through emphasis on fulfilling the needs of those

who have either internal or external interest with the business organization (beneficiaries) relying on periodical and immediate performance measures for each management level, where timely decision making is necessary to hunt available opportunities.

### **9.5.2 Transaction processing**

Results related to transaction processing came in at third position with medium level materiality of 18.61% and optimal performance weight of 0.019%. Here emerges the need to modify the accounting mindset so that a more in-depth and comprehensive approach is taken that considers and balances both quantitative and non-quantitative aspects. This need is a result of the lack of processing systems that provide banks with the information necessary for them to make strategic decisions. Banks need a measurement system that balances historical accuracy and integration of financial figures with the current performance motivators in order to achieve economic success. Moreover, competitive advantage can be achieved only if strategic vision includes knowledge of modern management methods in data processing operations. Banks' staff argues that despite this fact, the required methods have not yet been found for using information's cost and benefit in designing AIS. Most banks currently tend to apply advanced technology systems because they expect these to give them numerous advantages and benefits to be achieved, especially in light of the ongoing development of industrial technologies and the prevailing competitive environment. Respondents believe that the attributes and characteristics of the environment of modern banks' services affect the design of data processing methods. The concepts and philosophies of management and AISs should be considered in relation to the commercial banks' environment, the perceived benefits, the effect of applying these changes, and the desired outcomes. Thus, the adoption of advanced technology is not just a matter of selecting types of machines, equipment or methods, nor in making decisions regarding types and quantities of services. Management personnel must be aware of other factors such as competition and time, since the use of advanced technology alone is not sufficient. Even the advanced industrial countries, which use various levels of complex technology, experience performance that is less than expected. At the same time, results of some other business organizations were inconsistent and not final. In this regard, staffs argue that the advanced technology systems provide opportunities not advantages, since through rational strategic decisions, banks can translate opportunities into advantages. Each bank works under strategic and operational limits, and banks should work to eliminate weaknesses and make the most of their strengths by forecasting their strategic position.

### **9.5.3 Emerging technologies**

Results regarding emerging technologies came in the first position with high level materiality of 32.73% and optimal performance weight of 0.056%. These percentages confirm the necessity of relying on modern technological methods to support AIS function. The respondents confirmed that advanced technologies can contribute to the success of business organizations that seek to achieve quality and service performance quickly and efficiently. In addition it is necessary to use tools, methods and actions to transform inputs of business organizations, including banks, into services products. These include mechanisms, labour skills and procedures used for the transformation process. Respondents believe that the management personnel of commercial banks in Jordan should learn and comprehend technological developments, and to anticipate trends and rates of change. Astute managements should be able to foresee incidents, understand their significance, and reflect on ways in which such incidents can be used in their favor. Research and keeping up to date with economic, social and political developments would supply management with the cognitive data base required to successfully deal with changes in environmental factors. Current research and studies are sources of valuable information which, together with technology, can provide accurate forecasting ability.

### **9.5.4 Legislation**

Results of analyzing legislation came in at fourth place with materiality of 18.25% which is medium level, and optimal performance weight of 0.023%. The technology of producing services used at banks is considered as one of the basic factors affecting the design of MIS, as a important part of a business organization's structure. Results of analyzing also denote that the traditional AIS is not sufficient for the requirements of business organizations that use old legislations. Therefore, those business organizations might introduce changes on legislations especially those related to AIS, in order to provide legislative information for all management levels. Using old legislation might directly affect business organizations' management control system. The traditional performance KPIs are insufficient for guidance and monitoring. To overcome this deficiency, most staffs suggest using one of the modern accounting methods such as the BSC. The appropriateness and alignment of AIS legislations with the strategies is important, since it motivates management to implement the strategy and improve the bank's performance. In this regard, respondents believe that legislation plays a important role in checking the validity of the financial operations, and whether a unit's



financial report honestly expresses its financial position, and the extent to which it adheres to valid laws and legislations. Respondents also believe that it is necessary to update banking legislations to keep pace with technological developments in order to have strict supervision and monitoring of banks to ensure that they are adhering to the state's political, economic and financial guidelines. Legislations related to commercial banks in Jordan, such as bank laws and the Central Bank's instructions should provide guidelines for banking functions, one of which is the recently emerged AIS function. Moreover, the study's respondents asserted that the great growth of commercial banks in Jordan in terms of business volume, variety of activities, and multitude of objectives, necessitate the passing of laws and legislations commensurate with that growth. These banks find themselves having to cope with a constantly changing environment in order to guarantee their continuity and achieve their objectives, especially in terms of the political and legal environment. This aspect might be the most important one of the external environment, which the researcher confirms, and the most influential on banking operations. Respondents also asserted the necessity of providing KPIs that analyze and address the following environmental factors:

- valid systems, laws and legislations
- public financial and monetary policy

If new KPIs can address the previous circumstances, the required balance will occur between the bank's AIS environment and the external environment of policies and legislations. This would free the manager from facing these problems, and provide him with the required quantity of information to make better decisions.

## **9.6 Verification from Learning and Growth KPIs based on the study findings analysis**

The Learning and Growth KPIs will be verified according to the study findings analysis as follows:

Table 9.6: Ranking the drafting positions of Learning and Growth KPIs

<b>Learning and growth-KPIs</b>	<b>Position of Importance</b>
Job satisfaction	third position
Innovation and novelty	second position
Training and skill	first Position
Knowledge flow	fourth position

### **9.6.1 Job satisfaction**

Results of job satisfaction analysis came in the third position with materiality of 25.92% which is medium level, and optimal performance weight of 0.030%. These results support what the respondents have argued: that staffs' satisfaction with the assessment process is determined by the aim of the assessment process. If the aim is development, staffs' satisfaction with performance assessment would be positive. The respondents affirmed that if a performance assessment system exists in the business organization, it is necessary for the assessors to appropriately and accurately apply the system, which requires organization of time and effort and adequate support by top management. The system should include the business organization's procedures and produce results that contribute to decision making, stronger control and observation. Those who apply assessment systems should explain the purpose of conducting performance assessment, in addition to providing a program that would help managers to conduct assessment very efficiently. The program should include a list of do's and don'ts for the assessors. Job satisfaction as an independent KPI is considered in this study as it affects the personal lives of staff and in turn will therefore have a positive or negative effect on the bank depending on whether staffs are satisfied or dissatisfied. Psychologists consider job satisfaction as an important issue since most people spend most of their lives at work. Consequently, it is necessary to discuss job satisfaction and its role in the personal and career lives of staffs. Another argument suggests that job satisfaction increases productivity which ultimately benefits both the staff and the business organization. The study respondents believe that using a special code to provide the bank with the necessary information to manage and solve staffs' problems is very important in achieving satisfaction for them. They also suggested that banks provide recreational spaces for their AIS staffs to relieve the stress and pressures of work-related tasks. Moreover, such spaces would encourage discussion and debate about work-related problems and therefore are conducive to problem-solving by brainstorming possible solutions. Respondents also suggested that their systems should offer protection against various types of stress including physical, intellectual and visual. Also, systems that objectively assess staffs and consider them for promotion in accordance with clear criteria should be recommended by banks' management. The respondents of the study confirmed that each worker has different personal and professional needs, the fulfillment of which in the workplace leads to better job satisfaction. The worker also has many values that can be achieved within the scope of work, where job satisfaction increases as these values are achieved. Respondents recommended that systems promote staffs' self-respect, since it is a desirable objective in more than one field especially at work through the position or the nature of job. Thus, the AIS that

documents the characteristics of an individual's personality and his circumstances, represented in his perception, personality, abilities, aptitudes, ambition, intelligence, the extent of loyalty and sense of belonging to the department, chronological age, experience, monthly income and the extent of role these properties play in the individual's execution of work tasks, provides feedback on the extent of staff satisfaction.

### **9.6.2 Innovation process**

Results of analysis of the innovation process came in the second position with materiality of 26.45%, which is medium level, and optimal performance weight of 0.030%. Respondents saw this as the individual's ability within an encouraging and proper management environment, to suggest an idea or a new task, characterized by fluency, flexibility, originality and its development in accordance with individuals' and groups' capacities. The study's respondents confirm the importance of various types of innovation including programmed and non-programmed innovation, innovation based on methods and objectives, innovation related to the extent of novelty and modernity, and the individual and group innovations suggested by staff in commercial banks. They also confirmed that Jordanian banks need to encourage and accept innovation especially given the competitive environment in which the commercial banks operate. Hence, units should be established that are concerned specifically with encouraging and developing innovation within an organizational environment and organizational structure that encourage organizational belonging and loyalty, while adopting human management methodology, which leads to applying better technical methods which encourages innovation. The respondents maintain that the innovation process increases the technological level, which leads to the adoption of better technical methods that keep pace with current technological developments. Respondents also believe that innovation takes many forms including: expressive innovation, productive or technical innovation, creative innovation and imaginative innovation. These levels benefit the innovators through conclusion, analysis and linking relationships in order to enhance innovators' capacity for creative thinking. The researcher maintains that KPIs can actively contribute to improving the performance of AIS in this respect; however, these are currently not applied in banks where they have been ignored or have disappeared. In addition to that, respondents emphasized the necessity of constant adoption, care and development of innovations as they are important in maintaining banks and their development through the KPIs of the innovation process. Also, to use all modern methods that guarantee staffs' rights, determine their performance and decrease efforts in routine procedures in order to devote to

the best and give them the role in solve hanging problems and correcting mistakes and deviations during work process. Failure to provide them would ultimately discourage staff from suggesting innovations. In addition to the above, and to improve the innovation process in banks, the study respondents recommend increasing the suitable financial and non-financial incentives for the innovators in banks, attracting innovators and providing departments and divisions with those innovators. Also, banks should not to hesitate to apply new methods and undertake risks with fears to failure, since pioneering and initiative are not achieved through headquarters but also through other external departments that should be followed attentively as this is often where pioneering occurs. Exploring the inner self limits thinking and narrows one's horizon; however, absorbing and reflecting on others' experiences encourage original thinking and creativity. In this context, the respondents confirm that an increase in the innovation process would occur by generating and applying new ideas and methods to produce new services and provide them to customers, creating new feasible fields of work, utilizing marketing opportunities by using new networks and decreasing the time required to establish a new service.

### **9.6.3 Training and skill**

Results of analysis revealed that training and skill came in the first position of materiality at 27.32% which is medium level, with optimal performance weight 0.030%. The success of AIS function and its effectiveness depend basically on qualified staff with sufficient scientific qualifications and experience to operate the system and achieve its objectives because a system without qualified staff to operate it would not be effective, even if it were designed with high precision. Therefore, emphasis should be on training the current staff or employing new ones with a high level of skills. Regarding accounting, individuals in the accounting field should develop the skills that they will need to cope with all new developments, realize the interconnections that impact on the modern business environment, and enable them to analyze various data for the stakeholders. Also, they need to develop the ability to present timely and final reports and financial statements as soon as possible, which would increase the benefits to stakeholders. In accounting systems, which is the most prominent in AIS, it is necessary for staff to have sufficient knowledge of computer operations, programming and related modern techniques. In fact, all of the previous procedures need appropriate systems in order to provide proper staff training and skills, since this seems to be impossible without such systems. Respondents believe that the management personnel of banks must ensure that their staff have the appropriate training particularly

regarding the understanding and use of modern technology, and develop communication skills by undertaking specialized courses to increase their creativity. Also, banks' management should increase their vertical and horizontal communications to activate their internal communications which encourages innovations and improvement of skills. In addition to increasing concern of conducting special studies on methods of developing business through banks which has great impact on creativity. They also pointed out that under the AIS' advanced technology and what it provides in reducing the cost of gathering and operating data, the accountant's role should be taken into consideration. It is the accountant who is responsible for using his scientific knowledge and practical experience to extend managements' awareness of the significance of advanced methods in producing accounting data for various stakeholders.

#### **9.6.4 Knowledge flow**

Analysis results show that knowledge flow came in the fourth position of materiality 20.31% which is medium level, with optimal performance weight 0.021%. This indicates the extent of the need to apply a new system to assess performance through staff participation and encouragement to view their jobs in the context of the overall performance of the business organization; also, there is emphasis on staff collaboration with superiors in determining performance indicators and criteria. The conclusion is that the group decision-making support system is an interactive one based on AIS in order to facilitate finding solutions by a group of decision-makers for non-structural problems who work as a team, not independently. The collective result of a group of components is usually greater than the group of results of those components working independently. Hence, it is preferable that all decision-makers work as a team in order to maximize the final output of the decision-making process; moreover, the collaborative approach ensures consistency in decision-making, especially if a crisis arises. Therefore, banks should develop and encourage problem-solving and decision-making using a group approach, something that cannot be achieved with traditional methods. The study respondents believed that the major factor to consider when adopting a group decision-making support system was the establishment of interactive KPIs based on AIS that enable solutions to be found for a set of un-structural problems. They also confirmed that the systems that support group decision making through participation of staff should include the attributes of group decision-making rather than the individual decision. Also, there is the need for intensive use of communication technology by staff at all levels, including those performing specialized banking activities, Moreover, system components

need to be designed so that in the decision-making process, negative behaviors such as forced opinions and conflict are minimized, and positive behaviors such as brainstorming, are encouraged. Respondents affirmed that this procedure might contribute to supporting KPIs that improve decision making, which is designed through programmers that aim to support staffs' decision making at all job levels and specialties. The purpose of applying it is to support and confirm the group decision-making process, since it includes mechanisms that limit any negative behaviors of decision-makers, which gives greater credibility to the results. On the other hand, the study respondents argue that when banks apply the concept of enabling (delegation of powers) to staff, they are empowered with the ability to have more control of their work, more freedom, and greater responsibility or empowerment. Respondents believe that empowerment shows trust in others since managers concede of some of their powers to others; it produces more flow of information between stakeholders, increases debate, understanding, and respect, and promotes new opportunities. This would establish the major supports for releasing staffs' creative powers in order to improve AIS performance results at banks. Respondents also indicated that empowerment does not mean giving absolute freedom; rather, it is a calculated and rational freedom, with a suitable basis to give the staff an opportunity to learn and discover new methods to solve problems and overcome obstacles.

### **9.7 Verification from Internal Control KPIs based on the study findings analysis**

The Internal Control KPIs will be verified according to the study findings analysis as follows:

Table 9.7: Ranking the drafting positions of Internal Control KPIs

<b>Internal control-KPIs</b>	<b>Position of Importance</b>
Regulatory controls	second position
Access controls	first Position
Processing operations	third position
Control inputs and outputs	fourth position

### **9.7.1 Regulatory controls**

Analysis revealed that the regulatory controls came in the second position with medium level materiality 26.30% and optimal performance weight 0.022%. The significance of this KPI is obvious in that these technological systems are here to stay and should be utilized. The use of internal control in AIS in the Jordanian commercial banks faces great challenges, such as:

1. Absence of documentation for most AIS operations;
2. Difficulty of detecting banking operations in the absence of automated detection mechanisms;
3. Difficulty of operating the system in the absence of technologically qualified professionals; and
4. Conflict of interests between stakeholders especially system designers and users.

These problems were reflected in the control of most AIS operations, which usually prevented crises with clients or migration to other banks, which in most cases is a result of inability to protect banks' data. Furthermore, most notably AISs have contributed recently to the improved efficiency of internal control systems; however, the complexity of systems is increasing together with their capacity to adapt to accelerating technological developments. Respondents believe that the regulatory controls have several advantages in relation to overcoming previous problems and obstacles since the regulatory controls distribute jobs and activities in a practical method, eliminate duplication in specialties, determine relations among staffs and coordinate their work explicitly. The correlation and integration between the departments and operations of an organization always require a flow of data and information between the various departments in using obvious communication methods. System designers need to know the information requirements of various departments and determine the lines of communication by taking a comprehensive view of the organization's hierarchy. Thus, AIS should be correlated and integrated with the organizational hierarchy, in order to achieve the flow of reports and data between the departments. Also, it should guarantee that suitable data and information is provided to the stakeholders accurately and in a timely manner. The integration and effectiveness of the accounting system is impossible unless it is integrated and correlated with the organization's operations and departments, achieving a smooth flow of the required data in a timely manner at the lowest cost. The respondents affirmed the importance of limiting staffs' responsibilities in the IS department only. Enforcing replacement between staff at the department would support the internal control; internal control also extends to limiting access to the original documents to the

specialized control staffs responsible for their own specialized areas. They affirmed the importance of documenting data flowcharts in order to guarantee their security and document the control procedures of AIS function, document operation instructions, and authentication procedures on all amendments on the data by the systems.

### **9.7.2 Access controls**

Analysis revealed that access controls came in the first position with medium level of materiality 27.92% and optimal performance weight 0.022%, which support the role of KPI in decreasing the complexity of accounting procedures through the automated systems in general. Also, they decrease the cost of operations in the long run, achieve high economic returns, limit the extent of budget execution by the extent of human relationships between the various management levels. Top management is the first and end responsible of managing quality activities, verification and control, which necessitates considering several procedures, mainly:

- a. The necessity of providing written quality policies, to be published and circulated to all staff members, since these policies are considered as general guidelines for staffs when executing their tasks.
- b. The necessity of setting up quality objectives for all staff members at all management levels, especially those related to constant AIS improvement by adopting the modern supporting technology.
- c. Authorize staff members and give them the opportunity to participate in making decisions.

The policies above contribute to documenting systems' operations in addition to providing appropriate and various controls to achieve them, which generally facilitate their control. It should be noted here that small-size systems' control is achieved through their final outputs. It becomes more complicated in large-size systems, where more indicators should be gathered from various types of systems (operational and applied) to guarantee integrity, integration, correlation of data, efficiency and effectiveness of the system. The respondents suggest that previous negative aspects of the internal control system can be avoided through access controls. This KPI enforces methods that would guarantee control over the natural security by not allowing access to a computer area and accessories or other devices that might indirectly affect computer operation, except for personnel authorized by management. Control should also define the potential natural risks related to devices where it is left up to



management to provide the necessary procedures to eliminate risks or attempt to balance them in case of medium level risk, or accept such risks as part of the day's work. Respondents also noted the necessity of having logical access, which should guarantee protection of the saved data in AIS systems from unauthorized access, corruption or deletion. The extent of this depends on decisions related to the intended security level, that is, the level of logical access risks decided by management. Access controls can be utilized to determine the program to be used with verification. Verification and documentation methods should guarantee the required level of proper verification and accuracy to identify the person before allowing access to data. Bank management can also apply access controls by prohibiting the use of any programs on a bank's devices apart from their normal trusted programs. In addition to passwords, there should be user identification and data conformity with the main security files. Likewise, the previous procedures are to be applied to the main operation system, with periodical changes of user data. Respondents also affirmed the necessity of having a system that provides security against viruses, since AIS is upgraded and is becoming more sophisticated by time. Finally, to avoid the previous problems, researchers recommended making backup copies of files for specific periods of time, to be available for recovery in case of corruption or loss. The procedures of system development and property for personnel definition and authorization to secure and integrate operations should be properly documented.

### **9.7.3 Processing operations**

The processing operations came in the third position with medium level of materiality 25.70% and optimal performance weight 0.022%. This confirms the necessity of data gathering, recording and processing properly; thus, all inputs, processing and outputs should be free of errors or symptoms of data invalidity. The absence of this KPI might lead to increasing errors in input operations, in addition to the increase of substantial and important errors in the produced information, such as errors in a client's balance or final accounts, to name a few. Such issues would increase daily problems during system operation, which result in default of data produced by AIS, consequently providing false or defected information to the client, and definitely causing confusion or wrong decision-making based on the inaccurate information. Certainly, an internal control system requires correct and precise information with control on input, processing and output operations in order to verify that the system produces and provides information based on its design criteria. The numerous technical developments in data retrieval, storage, processing and delivering of

results to stakeholders might require the banks to have a person in charge of AIS. This person should have the ability to handle all other systems through their information systems, since IS is the common tool linking all the systems. In addition, the best use can be made of the characteristics and properties of the developed devices in handling mass volume and diversified data, thereby facilitating the bank's achievement of its objectives. Hence, according to the respondents, the improvement of AIS depends on following a set of operational procedures and rules that ensure that its original purpose is achieved. Also, the respondents maintained that AIS should include all the monitoring procedures that guarantee the validity of inputs, processing operations and control on outputs. This process aims to provide a reasonable degree of certainty that data processing operations will be in accordance with AIS applications. Based on the above, respondents believe that processing operations should include many KPIs that prevent manipulation, fraud, deception, distortion or poor presentation of data. One of the methods to be improved, or else adopted if it does not exist, is to compare control totals of input phase with the control totals after processing all of the banks' accounting operation results. This method is recommended as a test procedure to ascertain the soundness of inputs and processing for all of the data. They also emphasized the necessity of including automatic revision programmers in the accounting programmers for all of phases of data processing, conducting special periodical tests that include accurate testing and correction procedures. In addition there should be programmers for verifying rejected or false data with records kept of all modifications, rejections or deletions, with the reasons for these. Finally, special KPIs should be adopted to detect updates to files related to data, and link the mechanism of errors' notification in system operations directly with control parties or those in charge. They also recommended the necessity of ensuring integrity in processing by setting up policies that determine soundness and integration of protection system operations, authentication and periodic assessment by specific persons or groups, and assign persons in charge of setting up policies of safeguarding and integration of system operations, and to be replaced periodically.

#### **9.7.4 Control inputs and outputs**

Control inputs and outputs came in the fourth and last position with medium level of materiality 24.12% and optimal performance weight 0.022%. These results indicate that this KPI gives high credibility to AIS inputs and outputs, especially in the presence of a technically and accounting-qualified team. It is believed that this KPI helps to eliminate personal prejudice in decision making; thus, AIS inputs and outputs are unbiased, generating

confidence among stakeholders in general, and management and users in particular. Accounting information is of great importance to shareholders, and their pivotal role necessitates discussing all developments that affect the improvement of their outputs in accordance with the requirements of users, taking into consideration the sequential changes in their IT environment. Certainly, the simplicity of gathering data and processing them as inputs facilitates providing information to stakeholders. On the other hand, the system is considered defined when the situation of the system and its outputs can be defined in response to a specific set of inputs. In other words, outputs may be defined based on the inputs used. Most often, the data flowing in and out of the system require storage, retrieval and maintenance, and the system is automatically affected by external and internal effects (feedback) that consequently require system operations to be modified. Eventually, all these activities cannot be ignored without consideration or assessment; rather they should act in accordance with previously set criteria and procedures (control). Consequently, banks should seek quality of information, reports, financial, management and investment reports resulting from information, in order to retain invested monies. Respondents argue that there is a time lag between discovering a discrepancy and rectifying it; therefore, control methods should be provided in the AIS that can anticipate and deal with future problems. Thus, control is applied to inputs before operating production factors, based on predicting future incidents and revealing problems before they occur, in order to avoid them or limit their effect. Respondents believe that if inputs are prepared properly, then outputs will be accurate. It is also important to have a sufficient volume of original documents and detailed data of readable outputs. This can be achieved by providing original documents in a manageable method, and preparing detailed data of outputs that enables control parties to immediately track the flow of such data at every phase, since the final outputs of each phase will later become inputs for the next. The respondents also believed that it is important to have control parties in case of errors or deficiency in outputs upon detection in any phase. Also, KPIs should have the capacity to conduct a detailed check of all output results, including the outputs of operation activities and the control aggregates in order to check their accuracy. Furthermore, the KPIs enable the comparison of operating process records with input operations or records of terminal units' operations, in order to ascertain that the processed operations match those entered. Also, they can verify the extent of agreement of the control aggregates of processing with those prepared before processing, and investigate causes of variance, if any, and allow conducting logical relations test between output items. Finally, respondents recommend that, in addition to the previous elements that should be included in the KPIs-AIS, the internal stakeholders in banks and the external stakeholders should

carefully examine all outputs received by conducting the necessary tests to verify the extent of their accuracy and report any defects.

## **9.8 BSC-perspectives**

In the previous sections of this chapter, the researcher verified the AIS-KPIs findings from various perspectives. This section will verify the findings related to the BSC-perspectives themselves. Each AIS-perspective is aligned with a set of performance KPIs related to a business organization's objectives. An organization's objectives and KPIs are determined by its vision and strategies; therefore, the major perspectives included in the BSC may differ from one business organization to another. In this context, findings of the Jordan's commercial banks' perspectives will be analyzed.

### **9.8.1 Financial perspective**

The financial perspective is concerned with the fundamental financial guides as a core of other perspectives and related KPIs included in the BSC to reflect values for shareholders. This perspective reflects the banks' concern with profit, as every entry should be considered as part of a network of cause-effect that helps to improve the financial performance in the short and long terms. The shareholder wants to achieve objectives, which is to develop return on shares in the short term, while, at the same time, maintain continuous rise of return, which supports shares' position in the market. This might face continuous increasing inflation, which cannot be reached without bank's policy to consider decreasing cost, achieve flexibility in producing services, continuous development of improvement policies, and other policies. Generally, respondents believe that the KPIs that will improve AIS performance in this study, related to the financial perspective, encourage banks to persist with efforts to increase their share of the market, which in turn increases the returns on investment. Those KPIs show whether applying bank's strategy contribute in improving AIS performance in the lowest levels. Despite critics against banks' policies in adopting assessment to their performance on financial information systems, such policies are still necessary as a result of uncertainty in the relationship between bank's operational activities and the financial progress. Bank's effective financial control can be dependable in executing the comprehensive quality control programs.

### **9.8.2 Customer perspective**

Customers' perception of a bank's business performance is the first priority for top management in the commercial banks in Jordan, whereby banks recover the costs of their service products and achieve profits out of clients. KPIs should summarize the elements of performance considered to be fundamental for a bank's success in fulfilling clients' requirements by: providing new services for the consumer or providing new benefits; decreasing delivery time and the cost of services delivered to the consumers, and the volume of work consequent to utilization, which results in quality cost reduction, consequently increasing the resulting value and benefit to shareholders. Customer satisfaction is considered as one of the major objectives sought by banks' management, which is achieved by acquiring new customers and serving a new area in the market. Maintaining the current customers can be achieved by the lowest performance level, while formulating the target of customers' satisfaction depends on the technique of analyzing customers' profitability, which constitutes one of the major fundamentals that are the foundation of a successful management strategy for any bank. The study respondents believe in the value of setting up a list of tasks defining the services provided to the clients, then translating this list into specific KPIs reflecting the factors considered indeed important for customers, such as: time, quality, performance and service, and service cost. Those include KPIs that represent success returns of the strategy formulated properly and executed properly and lead to improved performance using AIS methods and their modern systems.

### **9.8.3 Internal business process perspective**

The internal business process is concerned with commercial banks with all their internal vital activities that differentiate those banks from other banks in Jordan, and are used to ascertain customers' needs together with shareholders' purposes. The good performance of customer service emerges from operations, decisions, and actions inside the organization, where managers are requested to focus on the basic internal operations and achieve harmony between them to create value for customers and shareholders. This element can be expanded to establish a series of complete values for internal operations that include current and potential clients' needs and set up solutions for these needs. The organization's internal business process reveals that the two basic differences between the conventional method of performance and BSC are:

1. The conventional method emphasizes the improvement and development of current phases and activities, while the BSC method determines distinctive BSC objectives in new phases and activities in order to meet customers' requirements and the financial purposes and objectives.
2. The BSC balanced objectives emphasize the activities of creativity, development and their phases and interactions within the perspective of operations and internal activities of the business unit; this requires organizations to create new products and services to meet both current and future needs of customers. However, the conventional method of performance assessment emphasizes only the current activities related to providing available products and services for the customers.

The target society of the study believes that the internal KPIs in BSC arise from bank operations that have an important effect of customers' satisfaction, such as the factors affecting the services' production time cycle, quality, users' skills and productivity. The most important ideas arising from the survey participants' responses can be summarized as follows:

- It is necessary to develop a cost system that is suitable for modern requirements of cost information, and suitable for modern project development.
- IT must be supported by computers and applications and these should be considered as a tool for decision making, not only as a method of providing information.
- The decision-making process should be prompt, taking into consideration the issues of freedom given to performance centers.
- An organization's cost system should be characterized by dynamicity while simultaneously aligning with the type of decision that needs to be made.

Performance, in terms of technical and technological aspects, aims to create long-term financial effects, by affecting the profitability of shares, and achieving return on investments. Also, the effect of capital additions to achieve technical and technological development requires another method of assessment, as a result of the high cost of investment in the short term, which negatively affects bank's profitability, consequently requiring a different method to assess performance. Modern technological additions have had many effects on the financial and accounting aspect of banks' AIS performance, as follows:

1. They achieve consistent development considerations related to flexibility in fulfilling customers' orders and decreasing delivery time.
2. They increase the use of available resources, especially those that control performance.

#### **9.8.4 Learning and growth perspective**

This perspective focuses on organizational learning and growth which is meant to determine the infrastructure that the organization should adopt for long-term innovation and development. The organizational learning of the organizations should address:

1. Personnel at all levels
2. Systems
3. Organizational procedures

Business organizations' management should invest in well-trained and highly-skilled personnel and support them with information systems. Organizational procedures or routines should be modified so that the learning resources are conducive to the achievement of future performance objectives. The learning and growth perspective addresses the way in which the bank can effectively adapt to changing circumstances to improve internal processes that benefit customers and shareholders. Also, by improving its ability to provide good products and consistently enhance the operational process, the bank can penetrate new markets and increase its profit margin which leads to growth and increase of value to shareholders. The study's respondents believe that it is important to take note of staffs' intellectual capabilities, their level of skills, the information systems and management procedures inside the organization, and attempt to bring these up to date with modern trends, results of which will be reflected in all of the previous perspectives.

#### **9.8.5 Internal control perspective**

The internal control perspective generally improves AIS effectiveness and efficiency in banks since it enables them to consistently adopt already determined rules and perform complex calculations when processing huge volumes of transactions or data. It also has the capacity to enhance the continuity and availability of accurate information. Moreover, it

facilitates data processing and increases the capacity to detect banks' performance activities and their policies and procedures. Furthermore, it minimizes risk resulting from control and increase in separating task assignments, by providing security control elements in applications, data bases and operational systems. The internal control perspective constitutes the technical performance which can be used for precise data processing or even to process precise data. It also limits unauthorized access to data that might lead to data corruption or improper changes in data, including entering unauthorized transactions or false ones, or inaccurate entry of transactions, resulting in specific risks when many users access a shared data base. The survey respondents believe that the KPIs in this study related to the internal control perspective will definitely provide a developed practical knowledge base for the AIS from the control perspective. This gives them an in-depth and comprehensive knowledge that provides them with the capacity to review information, examine and detect monitoring controls of AIS in the commercial banks in Jordan, and the extent to which such procedures and controls are aligned with the environment of the commercial banks. The internal control perspective also provides an integrated group of modern methods that include the monitoring controls available to the AIS in commercial banks in Jordan. Also, target group of the study believes that such procedures enable the possible early detection of errors during the cycle of data operation, and prevent any unauthorized use of the system, its file and records. This would lead to logical data preparation and organization that is appropriate for users' tasks and fulfills stakeholders' related requirements, in addition to providing consistency between the internal control KPIs and the common requirements and general monitoring controls at banks. Therefore, the internal control system is considered as a technical necessity to serve management based on its role as a proxy for stakeholders and its responsibility for protecting their investments and interests. Internal control includes all the necessary procedures and measures to protect and develop physical and assumed resources, ensure that bank activities are conducive to the achievement of planned objectives, and fulfill their responsibilities to shareholders and other parties. Also, since managements need access to sound and credible information for the purposes of planning, monitoring and decision-making, banks' boards of directors should be concerned with designing sound and reliable control systems.



## **9.9 The study's recommendations for the commercial banks in Jordan**

Results of this study indicate that AISs are generally not handled well by the commercial banks in Jordan. Although they have the necessary devices, programs, internet, local computer networks, etc., these are not used efficiently or in an organized fashion, and consequently are not cost-effective and productive. Therefore, in order to achieve the maximum benefit of AIS, the researcher recommends that a comprehensive long-term plan (strategy) be established that sets out the method of improving AIS function by defining KPIs to achieve this. Also, there is the need to base this method on facts using a scientific approach. Moreover, the following recommendations should be taken into consideration:

### **Recommendation 1: Improve the performance of AISs of commercial banks in Jordan by using the BSC approach.**

The BSC in the commercial banks in Jordan is an important management method and a tool to improve AIS strategic performance. Also, it is used to adopt integrated and comprehensive perspectives to achieve banks' objectives, and orient all management personnel and those concerned with the internal control and monitoring of the banks' activities, to the significance of BSC as a tool to measure and assess strategic performance and its other potential applications.

### **Recommendation 2: Develop an integrated AIS for the commercial banks in Jordan.**

Banks' management must take responsibility for the development of an integrated system that covers BSC perspectives, narrows the gap between stakeholders' current expectations of AIS services and what is actually delivered, and to address the discrepancy between the strategic objectives and performance as measured by the KPIs. Such an example would be an integrated bank management system that improves AIS efficiency and professional performance, thereby contributing to the success of banks. The banks' application of the KPIs suggested in this study is considered necessary to improve AIS performance in line with the use of BSC at those banks. Thus, it is necessary to apply an integrated BSC that considers all perspectives by including many of the necessary KPIs. This will increase the effectiveness of AIS as a strategic objective that aligns with the requirements of the modern competitive economic era.

**Recommendation 3: Improve the performance of AIS to increase the competitive of commercial banks in Jordan.**

AIS performance in commercial banks in Jordan needs to be improved so that the data it produces is based on the BSC which makes it more credible and fair at both local and international levels so that commercial banks are competitive. The needs of those who require information and data about the bank's activities would be met to a greater degree. AIS improvement might result in a long list of performance KPIs that should be dealt with carefully in order to obtain productive results, and BSC with its developed forms constitute a promising model that can assist banks to solve complicated issues related to AIS-KPIs.

**Recommendation 4: Continually improve the performance of AIS in commercial banks in Jordan.**

Because of the constant developments in information technology and its several applications, AIS improvement should be considered as an ongoing process that does not stop upon accomplishing specific phases. Also, it is important to constantly update AIS systems to cope with the accelerating and successive developments in the modern business environment. Furthermore, use the modern technological methods to improve AIS performance with consistent upgrade to them. To determine all internal operations in the commercial banks in Jordan, document their operations, and adopt modern technological systems that help in detecting results of such operations in a clear, precise and credible method for all of the processing phases of such operations.

**Recommendation 5: Correlate AIS outputs with all departments and branches of commercial banks in Jordan.**

Regarding AIS outputs, the researcher recommends the correlation of its outputs with all departments and branches of banks, based on their single requirements of information, depending on the nature of their work. This is related to their important role in development processes relevant to improving AIS performance and its role in serving various bank management levels and tasks.

**Recommendation 6: Establish a permanent staff group to improve the performance of AIS in the bank.**

AIS integrated systems consist of various sub-systems with their own particular specialized functions. These systems therefore require a permanent staff group of specialists who share the tasks, which results in team coordination, correlation and integration.

**Recommendation 7: Attract experts who are able to use the BSC in the commercial banks in Jordan.**

It is necessary to attract experts who are able to use the BSC in the commercial banks in Jordan, and encourage this team to innovate and excel by providing them with financial incentives and morale boosters in order to ultimately increase customer satisfaction. Subsequently, this would increase profitability and maximize shareholders' wealth and eventually improve the Jordanian economy's performance in general.

**Recommendation 8: Employ individuals with specialized academic qualifications in AIS in banks.**

Banks need to employ individuals with specialized academic qualifications in AIS, who can cope with the volume and level of the required tasks and positions. Also, more attention should be given to training and providing ongoing professional development for accountants and those in charge of AIS work, such as programmers, system analysts, and computer operators. Furthermore, management should follow up the performance of staff after training to ascertain whether or not the courses have had an impact on staff's execution of their work tasks.

**Recommendation 9: Recognise that the BSC can assist in setting strategic objectives of AIS in the commercial banks in Jordan.**

AIS performance should not be a separate target when merging measurement systems such as the BSC. The establishment of a strategy for banks' operations is a step in this direction since it achieves the requirements of strategic management. These requirements include linking a balanced group of KPIs with banks' strategic objectives, providing control standards and feedback information about strategic achievements, and increasing the significance of assessing banks' performance effectiveness in AIS fields. BSC can assist in

setting strategic objectives in the form of high accounting performance ratios and determining methods to achieve these objectives by examining the current accounting performance. Then, an effort should be made to improve accounting performance in order to reach the strategic objectives and provide governing performance KPIs that assist banks to predict future performance, in addition to KPIs that consider both the past and the present.

**Recommendation 11: Discuss job satisfaction and its role in the personal and career lives of staffs.**

AIS users, particularly key personnel, should be involved in the development and design of AIS. Financial incentives and morale boosters should be provided so that users experience satisfaction, offer less resistance to the AIS, and feel valued by the business organization.

**Recommendation 12: Support internal control procedures of AIS in the commercial banks in Jordan.**

Commercial banks should use AISs as major sources of information that provide important support for internal control procedures and confidence in the various reports supplied. Bank management personnel would need to use AIS efficiently and effectively and provide the financial, human and organizational requirements needed to automate information systems in banks. Also, this would increase the efficiency of information produced by these systems, support information network inside the bank and assist in assessing banking risks.

The application of the above recommendations in banks would enable them to maximize the utilization of AIS, consequently avoid the identified weaknesses. Also, it would emphasize the points of strength, which would give banks the opportunity to compete at their maximum capacity, regardless of market competition, and enable them to broaden their activities in order to increase their market share.

## **9.10 Conclusion**

The purpose of this chapter was to verify the results reached after analyzing the data of Chapter 8. This chapter discussed the AIS-KPIs in the study target (commercial banks in Jordan), their effect in terms of the BSC perspectives (financial, clients, internal operations, education and growth, internal control), and their role in improving the AIS strategic performance of the commercial banks in Jordan. The respondents acknowledged the significance of these KPIs, and managements are strongly aware of the fact that any improvement in AIS strategic performance requires dedicated and serious work. Banks' managements have a clear vision, through this study, of the basic strategic KPIs-AIS, which enable them to achieve a distinctive AIS performance. These KPIs have the ability to be changed or amended to adapt to the environment of a particular commercial bank, or amended if a bank's AIS circumstances change. This chapter also aimed to present the study recommendations. Finally, it can be said that the KPI is a performance improve tool for commercial banks in Jordan, and a technical tool that should be adequately and appropriately designed so that it is both credible and reliable. In the next chapter, the researcher will recapitulate the goals and findings of this study, discuss its contributions and the future work that can stem from this study.

## **Chapter 10 -**

# **Recapitulation, Contributions and Future Work**

### **10.1 Introduction**

This chapter includes two sections. In Section 10.2, the researcher presents a quick review and general conclusion of the study describing study procedures, the benefits of AIS at banks, objectives of the study, problems addressed by the study and its methodology. Also, this chapter discusses in more detail the results presented in Chapter 9 and the strategies suggested for the improvement of AIS performance in the commercial banks in Jordan. Section 10.3, Proposed Future Studies, discusses the future complementary studies that can be researched, or those that may be inspired by this study.

### **10.2 Recapitulation**

This study aimed to improve the AIS performance in the commercial banks in Jordan, using an integrated system of performance measures called BSC from the financial and non-financial perspectives, identified in this study as: financial, customers, internal business process, learning and growth, and internal control. KPIs related to these perspectives were revealed and classified, and their relationships with, and their effects and influence on, the effectiveness of AIS performance in those banks, were examined. This study produced results that can lead to establishing a comprehensive AIS strategy the purpose of which is to achieve and maintain a competitive advantage, provide the attributes that produce comprehensive information for different stakeholders, and improve and maintain the internal control systems. This study concluded that all of these elements together lead to the development and improvement of AIS performance in the commercial banks in Jordan, thereby improving AIS operational performance with different materiality determined by the

relationship between the targeted elements and objectives. In order to enrich the subject and determine the nature of AIS and BSC model and its application philosophy, a quick review of this study is presented:

- The study of AIS is important given the important role of information in contemporary life, especially in the commercial banks, since the information produced by these systems is considered as a major resource for all business organizations of various types, mainly the commercial banks. Such information constitutes the backbone of various decision-making processes, which helps banks' managements to achieve their objectives of growth, continuity and competence. On the other hand, providing effective and efficient AIS contributes, to a great extent, to achieving the objectives of commercial banks and ensuring that their business activities are appropriate for the powerful competitive market. Also, the availability of effective and efficient AIS helps those concerned with banking activities and any interested parties to obtain precise, objective and timely quality information that would contribute to successful control, planning, performance assessment and rationalization of decisions since the outputs of the current systems are the main inputs for the success of executing those operations.
- Regarding the overlap and multiplicity of relationships between AIS and MIS, there were multiple opinions from authors and researchers, making it difficult to arrive at a decision about the best or most important system. The American Accounting Association (AAA) made an attempt to reconcile the different opinions in a report stating that AIS and MIS were separate systems, each with its own functions. However, by coordinating their separate functions, their separate objectives can be achieved together with the general objectives of the overall system of which they are a part.
- The problem of the study stems from the ignorance of some commercial banks in Jordan about the impact of AISs on the level of banks' success in performing their various banking business, indicating that AISs are not used efficiently and effectively. Also, the problem stems from the great interest in AIS from other commercial banks in Jordan, although they are unable to take full advantage of AIS and what it can offer. With the prominent presence and effective role that could be played by companies of systems, programmes and communications in Jordan in

formulating the level of service performance of banks in Jordan, ignorance of AIS on the part of these commercial banks would negatively impact on their market share and effective performance, bilaterally and jointly, and their competitive position. Despite the conviction of many of the commercial banks in Jordan that AIS is an important aspect of their daily operations, there are still some factors that limit the effectiveness of AIS performance. Hence, various critical problems emerged for the commercial banks, which are the main problems addressed by this study. Firstly, not including - a specific technology in any AIS field might prevent it from being effective; secondly, it may prevent the production of credible information for stakeholders; thirdly, it will retard any technical progress in its control operations. This would negatively affect the bank's performance in terms of providing highly efficient, low-cost services, and decrease its competence and competitiveness both internally and externally.

- Moreover, the problem addressed in this study has greater implications since the need for AIS in commercial banks increases whenever a larger volume of data emerges from conducting many economic operations for processing and providing data that benefits multiple users. AIS in any business organization creates a link between all decision-making centers and its executive centers, by providing the relationship between these centers, consequently between the overall system and the other systems that have impact on its business environment. Also, the significance of the AIS integrated system stems from creating coordination, exchange and correlation relations between the AIS and all its sub-systems, and MIS, with all its sub-systems. The researcher considered this, based on the final result of previous researchers' opinions, as part of AIS, which contributes to achieving a set of objectives including: decrease of producing information required for various parties, decrease of time and effort required to obtain information by beneficiaries. Currently, the objectives of commercial banks are not limited to obtaining more profit; rather, the multiple objectives include: decreasing cost and avoiding wasted expenditures, improving productivity, satisfying customers, contributing to the extension and diversity of products, improving quality and contributing to the general economic welfare of its society. Hence, there is an increasing need for information that will enable appropriate planning to take place in order to achieve objectives by providing a responsible information system. Also, a more comprehensive study of the problem revealed that an increase in the volume of banking operations in terms of diversity and services offered resulted in a definite



increase in: number of staff, customers, invested capital, multiple parties with a common interest. However, it became obvious that AISs in the commercial banks in Jordan are not capable of fully meeting and satisfying the need to provide information to those involved in the activities of commercial banks in Jordan, include the stakeholders. Nor are they capable of providing a means of assessment in a consistent and ongoing basis.

By reviewing the problem of the study, discussing its perspectives and defining it properly, the researcher has established a general objective to solve the problem of this study: The goal of this study is to improve the performance of AIS in commercial banks in Jordan, by using KPIs and analysing the relationships between them in order to achieve the AIS goal by using the BSC approach. The methodology of this study is based on defining the best KPIs to improve AIS service performance to introduce to the commercial banks in Jordan, and determine the materiality for the various perspectives. Also, the study tested the relationship between the KPIs' perspectives, and their major perspectives that result in improving AIS performance in the target commercial banks. This researcher determined the possible strategic effects of improving and developing AIS performance by seeking the opinions of the relevant managers at the target banks. Also, this study considered the opinions and propositions of academics and researchers in the same field. Results of analysis showed that the approach to improving a comprehensive strategy to improve AIS performance in the commercial banks in Jordan is comprised of eight objectives as follows:

1. Identifying the various key performance indicators (KPIs) that affect the performance of AIS in commercial banks in Jordan.
2. Using BSC to classify the KPIs that have been identified in the first objective, according to the perspectives and goals.
3. Identifying the sub-indicators of the KPIs for the various perspectives of BSC that have been identified in the second objective.
4. Studying and analysing the relationships and links among all KPIs and sub-KPIs. This is done by using BSC and identifying its impact on AIS systems implemented in the commercial banks in Jordan.
5. Developing strategies to improve the performance of AIS in the commercial banks in Jordan. This is based on the results obtained from the previous objective.

6. Establishing a logical framework of the comprehensive relationships, among KPIs and sub-KPIs on one hand, and the KPIs and strategic objectives, on the other hand and also to improve the performance of AIS of commercial banks in Jordan. It is also intended to assess the KPIs according to their importance in achieving the strategic objectives.
7. Validating the proposed BSC model to test the KPIs which will lead to improving the AIS performance in commercial banks in Jordan.

### **10.3 Contributions**

Below is a conclusion of the procedures and methods used to achieve the aforementioned objectives.

The study defined the attributes and strategies of AIS indicators and the related factors in order to improve their performance by reviewing the relevant literature (Chapter 2). The researcher developed the methodology of the study based on the factors found and its compatible tools required for analysis, following the advice offered by specialists in the field. The BSC method was used as a tool to achieve the objectives of this study because its characteristics are appropriate for the purposes of this study. As mentioned above, the concept of BSC measurement was first introduced in 1992 as a strategic tool in business organizations by Kaplan and Norton, and became an intelligent means of measuring business organizations' performance and indicator of how business organization can achieve their goals and missions in an effective, if non-traditional manner. The BSC model is considered suitable as a tool for measuring performance, and includes a set of strategic financial and non-financial KPIs. Also, it is different from the strategic measurement systems in that it includes measures for outputs and performance drivers for these outputs, which are connected together in a series of causal relations. But the basis for the design of this model is that the financial and non-financial measures should represent part of AIS in the various management levels. This model relies on the concept of strategy which indicates that a strategy of competitiveness requires linking business organizations with competition powers in its relevant industry, emphasizing, at the same time, customers and shareholders' interests. Thus, these groups of KPIs were designed to improve AIS strategy in the commercial banks in Jordan, where these KPIs included in the BSC perspectives are derived from the

commercial banks in Jordan, and their strategies focus on customers, staff, and investors' concerns, by linking performance measures with banks' objectives and strategies and their activity units. Furthermore, the ultimate value for the concept of using this model is achieved by aligning the work of the staff from the top to the bottom of the organizational hierarchy. This could be done by setting up objectives and linking them with AIS strategies, where this strategy is the sole engine for all, linking the sub-objectives with the strategy, and adopting the principle of cause and result. These factors might contribute to reducing one of the problems that face the application of strategic measures, that is, the gap between the planned strategy and the actual implemented strategy. To decrease this gap or discrepancy, suitable strategic measures must be created at all levels so that AIS functions can be controlled and organized.

The researcher also used the AHP method to provide values for materiality all the elements of the BSC model, starting from the strategies and ending with KPIs, where this method facilitates its judgment and interprets the power of relationship between them. This would assist the researcher to solve the problems of fair selection, based on a scientific method. Since the emergence of the hierarchical analysis of Saaty, which proved to be successful and highly efficient, especially in solving the problems of selection, it was used as an organized method to handle complex decisions. It was used instead of enforcing improvised solutions to "rectify" a decision. Also, this method assists decision makers to find the solution that best suits their requirements and resolves a problem. The researcher attempted to establish a comprehensive and effective model based on the AHP method, but addressed its shortcomings by integrating it with the BSC method. The BSC method lacks the attributes of AHP method which provide quantitative values arrived at by comparing the available alternatives to the elements of the study. In order to obtain the materiality of the important elements, which have been determined in the context of the study sample, a questionnaire was developed in Annex (1). The questionnaire included the KPIs required to improve AIS performance in line with the objectives and purposes of this study, in accordance with the agreed BSC vision and strategy, serving AHP logical arithmetic results. The questionnaire was distributed to participants in the study, and the researcher analyzed the results by using the SPSS statistical programme to reach the agreement indicator. Analysis results indicated that the majority of respondents support the concluded KPIs, and that they play an important role in improving AIS performance in the commercial banks in Jordan, although there was a variance of opinion regarding some of the KPIs. The study concluded that there needs to be a specific mechanism that controls the improvement process, which can be adopted in accordance with the major three strategies as follows:

► **First Strategy: “ Achieve and sustain competitive advantage”**

This strategy relates to the conscious effort by commercial banks to improve and develop AIS in order to become more competitive. The possible BSC-perspectives to be adopted were used to select the KPIs that support AIS in competence and its application. Efficient and integrated AIS can provide suitable and trustworthy information in an accurate and timely manner, thereby reducing the cost of obtaining and analyzing information, giving banks a competitive advantage in the banking business, especially in terms of using the automated information systems which can reduce the average costs of financial services provided to customers. The usual bank transactions of receiving deposits and issuing loans are basic practices for any bank, but as a result of competition, have become the least profitable activities. Hence, there arose the need to provide new products and services and to develop instruments to achieve distinction for commercial banks and increase their market share. Activities based on information have become the major source of banks' profitability. Banks' investment decisions, such as in any other business organization, are characterized by their inability to definitely determine future returns of their various investments. This is because the future is vague and imprecise so that the decisions are made in an environment of uncertainty with its associated risks. Thus, the risks involved are made obvious when the results actually produced differ from the expected results, either positively or negatively.

► **Second Strategy: "Provide features that give comprehensive information to different stakeholders"**

The major purpose of AIS in any business organization is to produce and deliver information for beneficiaries (stakeholders), either internally or externally. Consequently, data should be prepared to suit the needs and requirements of those who follow commercial banks' activities regarding accounting information, where the outputs of such systems express the best of that information. To achieve this purpose, systems' outputs should consider the following:

1. Simplicity of design and simplicity of realization by all stakeholders.
2. Ability to provide periodical reports.
3. Accuracy and credibility.
4. Inclusion of all appropriate and relevant information.
5. Emphasis on the relative significance of issues related to the stakeholders.

6. Focus on the beneficiaries.
7. Flexibility and ease of adaptation to expected changes.
8. All reports should cover all aspects of activities related to banking business.

To achieve this strategy in the commercial banks, such information (outputs) should have qualitative attributes, mainly suitability and credibility, taking into account any special restrictions such as materiality, cost, and return. Also, systems should be restricted to producing only the information that is relevant and necessary for its users. This could be achieved by assessing its capacity to produce appropriate and useful information in performance assessment or decision-making. Various tasks and functions are carried out by the commercial banks. Given the diversity of services and products provided by specialized banking departments, there is an increasing need for information systems that secure integration and coordination between tasks and jobs of various bank departments. To achieve links and integration between the divisions and functions of the commercial banks in order to activate bank's activities and to efficiently achieve its objectives, consistent data and information auditing is required in various departments of the bank, since the provision of data and information determines the tasks in every department of the bank, in the framework of rationalizing its relations with other divisions. Also, this is important in the framework of creating integration and correlation required between these departments. The efficient AIS fulfills this purpose by being integrated with other information sub-systems in the bank, by linking them into one group of data that work on serving it and receiving some as inputs for others. The integration of these systems results in generating the activities of other divisions, and increases a bank's effectiveness with the presence of a wide and unified data base that coordinates and integrates all of the functions of a commercial bank. Consequently, this would maintain open communication channels between a bank's departments and the data base which has a positive impact on all activities. However, an efficient AIS is required if there is to be cooperation between a bank's divisions and departments, so that tasks can be accomplished efficiently and effectively. The researcher argues that systems' outputs are not considered as support for work tasks, rather are effective through all work activities. Thus, the integration of bank activities and events depends on an efficient AIS that provides an appropriate flow of data and information in a timely and adequate manner. The success and effectiveness of an integrated AIS system, and the extent to which its purpose is fulfilled, also depends on the knowledge and expertise of its operators. Consequently, individuals' skills need to be developed consistently and constantly. This is especially so in the modern

business environment where changes and developments are occurring all the time, making it necessary to develop the skills of individuals working in the AIS and MIS, especially those working in accounting, management and computers. It has become necessary to offer continuous educational and professional courses, in order to keep personnel up to date with developments in each field. This would inevitably increase the system's efficiency and effectiveness in achieving the general objective of the economic unit.

► **Third Strategy: "Increase the role of AIS in improving the efficiency of internal control systems"**

The presence of an efficient AIS in the commercial banks should provide better internal control of all the activities and operations of a bank. Internal control is intended to ensure that the business organization acts in accordance with the planned strategy to reach its objectives. A good AIS can control and direct the execution of plans and policies, assist in preventing mistakes by providing information that shows the achieved results in comparison with the established KPIs. This shows any discrepancies between intended outcomes and achieved outcomes and helps to ascertain the causes, using a method that suits the nature of the banking business. Discrepancies provide management with the opportunity to rectify the situation through positive actions such as motivating staff to improve their performance and engage in greater cooperation in order to achieve the expected objectives of AIS systems. The significance of internal control in the commercial banks is important in order to decrease the effect of multiple financial threats faced by banks. Consequently, in order for the AIS to have the required efficiency, it should provide sufficient protection for banks' sources and records against threats, and contribute to the efficient use of bank's resources. This can be achieved by providing all control procedures and activities required to achieve these objectives, such as adopting policies and procedures to overcome the threats and challenges that confront the bank. This would include both the traditional control activities and automated control activities to ensure that all departments perform their allocated tasks in an efficient and effective manner. The researcher defines these procedures as: the processes of executing control functions, where managers seek to ensure that the plans are executed, where the feedback ensures that all bank departments are acting effectively and are moving towards achieving its general objectives. The feedback is one means of providing effective control. The outputs of these systems constitute an effective control tool, where the researcher points out that AIS is not designed to provide information on accounts balances

that can be provided only through the financial statements; rather, it is designed to provide management control and information on the operational processes of AIS.

Consequently, to achieve the required efficiency in banks' activities and operations, a control system should be available. This would be possible with the presence of a timely tracking system for the operational processes with a system reporting on its efficiency and effectiveness, since the AIS in banks and internal control of operational processes are closely linked together. In addition to providing an internal control system of the credibility, required in the financial reports, which are represented in systems' outputs, they provide the required information on the extent of commitment to valid laws and rules, which enables management to know the actual facts and make the adequate procedures and arrangements in order to achieve the highest level of productivity for the bank. After reviewing the strategies that improve AIS in the commercial banks in Jordan, the researcher argues that KPIs should be included in those strategies in order to produce an integrated model for improvement. Consequently, integrated improvement of the systems can be achieved through those KPIs by including BSC-perspectives in the strategies. Improvement is also to be made parallel to all directions of these KPIs, not separately for each KPI, or ignoring their effect on other KPIs, thereby achieving a balance between them. In some cases, control disciplines and management control should not be ignored to achieve cost savings for the purpose of achieving competence. It is also not feasible to deprive some stakeholders of their right to obtain the required information, with strict, accurate internal control of its operations in order to decrease system risk and increase its security. A balance between AIS and KPIs systems should be provided in order to improve their efficacy. This study calls attention to the basic notion of a BSC model and the possibility of using it to improving AIS performance. Commercial banks in general should be aware of and realize the strategies and the general rules of the game. This should, in turn, be based on a unanimous agreement regarding the important priorities. Thus, the researcher argues that BSC has an important role, since it is a supporting tool in the entire operation aimed at achieving a common vision for the AIS business environment. It also provides a new basis for the strategic control of AIS performance. It is necessary for banks to adopt consistent levels of agreement regarding KPIs in order to maximise their function as a dynamic tool for management. In order to fulfill this purpose, adequate modern techniques are needed to facilitate its application. Moreover, it is necessary to use KPIs in all bank departments and in the daily deployment of AIS, which would provide the basis for bank management's daily agenda in every department. The use of KPIs cannot be considered complete unless the one KPI becomes a

dynamic functional part of the commercial banks' daily life, and is used as a tool to consistently improve AIS performance.

## **10.4 Proposed Future Work**

This study proposes future studies using the same methodology but applying it to a larger group, or on an international level; or future studies could use another methodology to emphasize the important role of the BSC in accounting practices and in improving AIS performance in the commercial banks in Jordan, since the results of this study pave the way for future studies in this field. In view of its results, and since the emergence of BSC application to measure business organizations' performance, it is recommended that the following studies be conducted in future to:

- Examine other factors that affect AIS effectiveness such as: user experience, customer satisfaction, control elements, activity type, volume of resources, etc. Such studies will consistently contribute to improving AIS performance, and help to meet banks' increasing and continuous requirements, especially AIS related to financial, customer, internal business process, learning and growth, and internal control factors. Also, it will consistently improve competence and increase accuracy and credibility of information resulting from such systems, consequently better serving stakeholders' interests.
- Discuss problems facing AIS users and designers in the commercial banks in Jordan. Future discussions should be thorough and comprehensive in order to develop all aspects of AIS. More studies should be conducted on the banking sector in Jordan, and other strategies could be adopted so as to improve AIS performance and other methodologies that would assist in verifying the results of the current study. Furthermore, emphasize the necessity of continuing scientific research into the most important effects on AIS of using other methods of IT and modern communications.
- Conduct a study specifying an ideal blend of AIS elements using BSC in organisations other than commercial banks. Further studies of Jordanian business organizations would provide significant information for comparison purposes and would help to determine the similarities and difference between methods used to improve AIS performance in Jordanian business organizations. This would increase



the opportunities for more discussion of related issues and making use of others' experience, thereby increasing the opportunity to consider alternative solutions.

- Determine the required AIS for banks that enable them to execute their work in the best mode, which requires conducting a comprehensive analysis of all banks' works and activities on the one hand, and discussing the restraints and challenges facing the application of BSC. Also, it is necessary to conduct in-depth studies to address such challenges in the commercial banks in Jordan, with particular emphasis on identifying the factors that hinder BSC application. Such studies should also reveal to the banking sector in Jordan the necessity of adopting this model and applying it in an integrated method, since this model provides the appropriate tools to measure the strategic AIS performance. At the same time, it is necessary to provide all of the suitable circumstances to activate its application, if they intend to achieve their strategic AIS performance. On the other hand, there is the necessity to undertake studies on the feasibility of adopting such BSC to improve BSC performance in light of an organization's special circumstances, where cost of its application is compared with its benefits and attributes.
- Examine the effect of applying AIS-BSC as a system to measure and assess the strategic performance in improving the transparency and accountability in the banking sector units, develop the soundness and efficiency of acknowledgment, measurement, and governmental declaration, aiming to rationalize public strategic decisions. Furthermore, study the effect of management leadership modes and the possibility of applying BSC in the Jordanian banking sector and the other public services sectors.
- Examine the relationship between the innovative and creative approach (improvement, development, renovation, modernization) and the BSC to measure and assess the strategic performance of AIS in the banking sector.
- Prepare a plan to improve AIS performance in Jordanian banks with periodical and consistent follow-up of this plan for development and improvement in line with the contemporary changes and developments, and educate bank employees to recognise the importance of improving AIS performance, and involve them in determining the KPIs to be adopted for this purpose. Also, conduct researches and field surveys of bank customers' views about their satisfaction with the services provided and the services that they expect banks to provide. Study customers' views and perspectives

to in order to identify their needs and requirements and the shortcomings of current banking services.

- Banks in Jordan could benefit from Balance Scorecard approach by developing AIS-KPIs by establishing a focus group from the staff of the bank. The group limits the future vision of AIS and establishes the corresponding strategies which have to be determined by planning the main perspectives according to the bank. The steps involved are establish vision, list strategic objectives, develop a strategic map, create performance metrics, determine and prioritize strategic initiatives and finally, communicate the balanced scorecard throughout the bank. By applying these steps and processes, each bank in Jordan would be able to establish AIS-KPIs which consist of relative important values. The new KPIs that have been established by each bank could be compared to the standard or general values that this research has achieved as a benchmark as shown in Table 8.48.

Future studies and research could be undertaken to further improve AIS performance for use in business organizations, especially banks, to accelerate the development of electronic banking and address the risks accompanying such development.

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# Appendix

## Appendix 1: The Questionnaire

**QUESTIONNAIRE ON**  
**Improving the Performance of Accounting Information System of Commercial Banks in Jordan**  
**By using Balanced Scorecard Approach**

Date:

JORDANIAN COMMERCIAL BANKS

Dear Sir/ Madam,

I am conducting a study on the above topic. This study is undertaken to fulfill the requirement of an academic program leading to a PhD (Accounting), Curtin Business School, Curtin University, Western Australia. By taking fifteen minutes of your valuable time, you are providing information that is pertinent to the study.

This study's main objective is to improve the performance of accounting information systems in Jordanian banks, by measuring the impact of implementing a Balanced Scorecard on the performance of an accounting information system.

The relevant staffs of all commercial banks in Jordan are asked to complete this survey. I will be most grateful if you could complete and return the survey by 20<sup>th</sup> July 2011.

Thank you for your kind cooperation.

Yours sincerely,

-----  
Mohammad Hamdan  
HDR Student – PhD Research (DEBI Institute)  
Curtin Business School CUPSA Representative  
Curtin University/ Western Australia  
ES-mail: [mohd\\_naser78@yahoo.com](mailto:mohd_naser78@yahoo.com)  
Mobil: Australia (+ 61449905052)  
: Jordan (+ 962777234531)  
Address: Western Australia, 25 Argyle Street. Bentley

## DEFINITIONS OF TERMS AND CONCEPTS

**Accounting information system (AIS):** is a set of hardware and non-physical data collections (inputs) that change into information (output). This information in the form of sub-systems, follows a major accounting system to achieve a set of objectives for the management and third parties. This is done through a communication system linked to the internal and external environment. This ensures the achievement of control.

**Balanced Scorecard (BSC):** is a strategic performance management tool, a semi-standard structured report, supported by proven design methods and automation tools, which can be used by managers to keep track of the execution of activities by staff under their supervision, and monitor the consequences arising from these actions.

**Mission of the organization:** is the major reason for the organization's existence, and has a great effect on achieving the organization's goals and objectives.

**Vision of the organization:** is the future that the organization works to achieve, or in other words, its "Long-term Business Direction".

**Strategy:** is the requirement to create and sustain a competitive advantage.

### **Balanced Scorecard Perspectives:**

Traditional performance measurements focus on the financial results, which quickly become outdated, and performance assessment sometimes needs additional non-financial information. Hence, there are four main perspectives underlying the Balanced Scorecard system and in this study there is an addition of a fifth perspective. These perspectives are:

**Financial perspective:** This perspective is taken as the final outcome of the activities of the organization, to achieve satisfaction and expectations of the shareholders by increasing the value of its investments and its profits. The results of this perspective are addressed to achieve the goals or stand at the level of profits derived by an organization's strategy to work to reduce costs compared to their competitors.

**Customer perspective:** This perspective is highly important since the administration of an organization seeks to achieve the highest degree of customer satisfaction. This has a great impact on the acquisition of new customers and increases the organization's ability to retain existing loyal customers and hence maintain its current share of the market. This perspective enables the organization to view itself from the customers' perspective.

**Internal processes perspective:** This refers to all the internal activities and events unique to the organization. This perspective assesses the degree of success of the organization and its ability to meet customer requirements. It measures the employees' skill levels in relation to service provision and productivity – hence, it measures the internal performance of the organization.

**Learning and growth perspective:** Reflects the fundamentals that must be adopted by the organization to create growth and effect the improvements required to achieve the goals in the long term, because failure to achieve long-term goals can result from the organization's failure to invest in human resources. Human resources is what helps the organization to function effectively and efficiently, develop techniques for the production of information support, and change routine procedures so that the organization can keep pace with modern practices.

**Internal control perspective:** The focus of this additional perspective is to achieve the desired goals of the internal control system, to protect money and increase performance efficiency in order to achieve the strategic plans of the organization. It is necessary to prepare accounting information systems that meet these goals while taking into account the relevant trade-offs between the acquisition and development of these systems and the desired benefit from them.

**DEMOGRAPHIC PROFILE**

**SECTION A**

**Please circle the appropriate choice or fill in the blank.**

**1) Your academic qualification (level):**

- a. Diploma b. Bachelor's degree c. Master's degree d. PhD
  
- e. If other(s), please specify .....

**2) Your major (Specialization or Study area):**

- a. Accounting b. Management c. Economics d. Finance
  
- e. Information Systems f. If others, please specify.....

**3) Job title (Current Position):**

- a. Manage or Vice /Assistant Manager
  
- b. Head of a Department or Vice /Assistant Head of the Department
  
- c. Auditor
  
- d. Bank Controller (Inspector of a bank)
  
- e. If others, please specify.....

**4) Please specify your years of experience in your current position.**

.....

**5) Please specify your years of experience in the accounting field.**

.....

**KEY PERFORMANCE INDICATORS**

## SECTION B

Instructions:

Please circle the most appropriate choice, from your personal point of view by choosing from the following scales:

- 1. Strongly disagree 2. Disagree 3. Neither agree nor applicable**  
**4. Agree 5. Strongly agree.**

NO.	Financial Perspective: <i>To what extent do the following indicators of accounting information systems contribute to achieving better financial results?</i>	Strongly Disagree	Disagree	Neither agree nor applicable	Agree	Strongly Agree
a1	The use of the available AIS to achieve results are higher than normal.	1	2	3	4	5
a2	The use of AIS to determine factors that affect profitability and then improve these factors.	1	2	3	4	5
a3	The use of Knowledge Management System to support strategic policies in dividing profits.	1	2	3	4	5
a4	The use of Electronic Bulletin Boards in meeting rooms to provide strategic feedback and then to provide this to shareholders	1	2	3	4	5
a5	To continue updating the bank website and its security level using the Modern Organizational Structure policy.	1	2	3	4	5
a6	The use of e-Commerce on the bank Website to provide services through the internet.	1	2	3	4	5
a7	An AIS design that allows it to be flexible enough to achieve the desired results.	1	2	3	4	5
a8	The inclusion of the AIS in the process of continuous improvement.	1	2	3	4	5
a9	The aim of the continuous improvement of the AIS is to decrease costs and to increase the revenue.	1	2	3	4	5
a10	To put in place active procedures in order to achieve the highest revenue from the available value of resources.	1	2	3	4	5
a11	To comply with different customer needs through the use of AIS.	1	2	3	4	5
a12	The use of AIS that allows managers to solve financial problems.	1	2	3	4	5
a13	The application of the Front-Office System (information receiving systems, decision support system, trade and currency exchange systems, investment management systems) in business operations .	1	2	3	4	5



<b>NO.</b>	<b>Financial Perspective:</b> <i>To what extent do the following indicators of accounting information systems contribute to achieving better financial results?</i>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor applicable</b>	<b>Agree</b>	<b>Strongly Agree</b>
a14	Preparing an e-budget to provide a long-term strategic plan in order to increase profit and decrease cost.	1	2	3	4	5
a15	The use of a Financial Information system to provide more accurate financial analysis and to increase productivity.	1	2	3	4	5
a16	The use of AIS in order to improve the use of assets.	1	2	3	4	5
a17	To create new activities that use AIS in a more efficient way to use the available assets in the most efficient way possible.	1	2	3	4	5
18	The improvement of the procedures of investment in bank capitals in order to increase productivity.	1	2	3	4	5
a19	The preparation of a Voice Response Unit to improve communication between employees.	1	2	3	4	5
a20	The application of a Global Accessible Interactive Website to link the bank with the international market.	1	2	3	4	5
a21	The use of an electronic communication system for research studies about customers.	1	2	3	4	5
a22	The application of a technical support unit to support the daily activities of internal departments.	1	2	3	4	5
a23	The application of an Anti-Money Laundering system to protect the national economy.	1	2	3	4	5
a24	The application of systems that contribute in activating the use of assets in bank departments.	1	2	3	4	5
a25	To use an effective AIS to increase and administrate future cash flow.	1	2	3	4	5
a26	To exert efforts to achieve a balance between futures' desired revenue and the performance of AIS.	1	2	3	4	5
a27	The proper use of AIS in order to measure the risks on the operating cash flows.	1	2	3	4	5
a28	To establish a plan to obtain financial funds and increase the working capital.	1	2	3	4	5
a29	The continuous effort in increasing the efficiency and ability of (ATMs).	1	2	3	4	5
a30	The application of electronic trading of securities on a world level.	1	2	3	4	5
a31	The use of Risk Management systems to face any financial risks.	1	2	3	4	5
a32	The application of Total Quality Management to achieve continuous improvement in order to attract and retain customers.	1	2	3	4	5

<b>NO.</b>	<b>Customers' Perspective:</b> <i>To what extent do the following indicators of accounting information systems contribute to meeting the needs and satisfaction of current and future customers?</i>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor applicable</b>	<b>Agree</b>	<b>Strongly Agree</b>
b1	The use of a Customer Satisfaction Survey through e-mail, vital for improving quality of service to discuss their suggestions and problems.	1	2	3	4	5
b2	The application of video communication to communicate with customers through video-conference to discuss their suggestions and problems.	1	2	3	4	5
b3	The use of home banking services to save time required to complete transactions.	1	2	3	4	5
b4	To provide more services to customers through mobile communication (Mobile Banking).	1	2	3	4	5
b5	To realize the significance of AIS as a main factor to obtain a competitive advantage.	1	2	3	4	5
b6	The use of effective AIS in order to synchronize internal procedures with main objectives or strategies.	1	2	3	4	5
b7	To take into account the fair market share before designing the AIS for a bank.	1	2	3	4	5
b8	The application of a customer complaint system to provide communication re customer perception of bank.	1	2	3	4	5
b9	The application of the loan by phone service to customers without the need to enter a bank.	1	2	3	4	5
b10	To use the customer relationship management system to improve the relationship between the customers and the management of the banks.	1	2	3	4	5
b11	The use of camera equipped security systems.	1	2	3	4	5
b12	The application of an expansionary policy to satisfy all customer needs.	1	2	3	4	5
b	The use of electronic means to provide services to customers such as (SMS services).	1	2	3	4	5
b14	The application of a database that categories customers according to their characteristics.	1	2	3	4	5
15	To establish a team to study the procedures that could increase the organization's ability to attract and retain customers.	1	2	3	4	5
b16	The application of a database to keep record of customers to measure the bank's ability to retain loyal customers.	1	2	3	4	5

NO.	<b>Internal Business Process Perspective:</b> <i>To what extent do the following indicators of accounting information systems contribute to the development of handling operations and service delivery?</i>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor applicable</b>	<b>Agree</b>	<b>Strongly Agree</b>
c1	The application of a strategic AIS to achieve determined objectives.	1	2	3	4	5
c2	To prepare an annual electronic financial statement to obtain vital information for future predictions.	1	2	3	4	5
c3	To initiate the measurement of performance with the initiatives and the overall strategy.	1	2	3	4	5
c4	To establish an appropriate plan to use the AIS in implementing the Balanced Score Card.	1	2	3	4	5
c5	The application of the Electronic Document Systems to facilitate processes.	1	2	3	4	5
c6	The use of communication systems to improve internal processes.	1	2	3	4	5
c7	The use of a Credit Scoring Model to record credit loans.	1	2	3	4	5
c8	The use of an electronic file transfer program to transfer files within the internal network of the bank.	1	2	3	4	5
c9	The application of an electronic data interchanges to exchange data with different branches.	1	2	3	4	5
c10	To continuously update the technology used in processing transactions.	1	2	3	4	5
c11	To use modern ways of communication to improve communications between employees.	1	2	3	4	5
c12	To study the main requirements of the AIS.	1	2	3	4	5
c13	To study the secondary requirements of the AIS.	1	2	3	4	5
c14	To provide an AIS capable of providing accurate and precise results.	1	2	3	4	5
c15	To activate the legislations of the AIS in banks.	1	2	3	4	5
c16	To maintain updated legislations.	1	2	3	4	5
c17	To unify the legislations of the AIS with the rest of the used legislations.	1	2	3	4	5
c18	To provide legislation that is flexible and useful to the information system.	1	2	3	4	5

<b>NO.</b>	<b>Learning and Growth Perspective: <i>To what extent do the following indicators of accounting information systems contribute in creating growth and improvements required to achieve goals?</i></b>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor applicable</b>	<b>Agree</b>	<b>Strongly Agree</b>
d1	To use a code to provide the bank with the required information to manage and solve problems.	1	2	3	4	5
d2	To provide a place where employees can take a break and discuss workplace issues.	1	2	3	4	5
d3	To protect the employees in the field of AIS from overwork and fatigue.	1	2	3	4	5
d4	To adopt an objective system in the performance assessment of the employees.	1	2	3	4	5
d5	To promote the employees according to pre-determined standards.	1	2	3	4	5
d6	To provide e-learning facilities within the bank to improve employee performance.	1	2	3	4	5
d7	To provide employees with passwords and usernames.	1	2	3	4	5
d8	To provide employees with passwords and usernames.	1	2	3	4	5
d9	To assess the management techniques used in the workplace to increase time efficiency.	1	2	3	4	5
d10	To reflect the management measurements on the management style used in the workplace.	1	2	3	4	5
d11	Use of an ID card system for employees accessing the electronic service department.	1	2	3	4	5
d12	The use of electronic learning resources for training employees on how provide services.	1	2	3	4	5
d13	To provide systems specializing in detecting learning needs.	1	2	3	4	5
d14	To provide learning courses to employees to remain up to date with technological advancements.	1	2	3	4	5
d15	To assess the activities in the research and advancement fields	1	2	3	4	5
d16	The application of the empowerment concept to give employees the ability to share the responsibility.	1	2	3	4	5
d17	The application of an employees' suggestion system to allow employees to participate in the decision-making process.	1	2	3	4	5
d18	The application of the knowledge management system to improve/increase the employees' knowledge.	1	2	3	4	5
d19	To encourage the participation of beneficiaries in the development of their systems.	1	2	3	4	5
d20	The distribution of duties to the employees according to their fields and experience.	1	2	3	4	5
d21	The encouragement of employees by their employers to increase productivity.	1	2	3	4	5
d22	The encouragement of employees by their employers to increase creativity.	1	2	3	4	5

<b>NO.</b>	<b>Internal control Perspective:</b> <i>To what extent do the following indicators of accounting information systems contribute in the protection of money and raising the efficiency of performance?</i>	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor applicable</b>	<b>Agree</b>	<b>Strongly Agree</b>
e1	To distribute the responsibilities of the Survey staff in the Department of Information Systems regarding their sectors only.	1	2	3	4	5
e2	Rotating employees in the Department of Information Systems.	1	2	3	4	5
e3	The limitation of access to original documents to control and data preparation personnel.	1	2	3	4	5
e4	The inclusion of a documenting system description.	1	2	3	4	5
e5	The documentation of control procedures for the system.	1	2	3	4	5
e6	The documentation of operating instructions.	1	2	3	4	5
e7	Limiting access to documentation to specialists only.	1	2	3	4	5
e8	The approval of all amendments.	1	2	3	4	5
e9	The application of a policy that does not allow the use of any software on any but the company's programs.	1	2	3	4	5
e10	The selection of passwords specific to each user.	1	2	3	4	5
e11	The use of pin numbers to access the electronic service department.	1	2	3	4	5
e12	The protection of the system against viruses.	1	2	3	4	5
e13	The reviewing of reports of the use of equipment.	1	2	3	4	5
e14	The merging of files at appropriate intervals to re-establish files.	1	2	3	4	5
e15	The comparison of control collections of the input stage with control collections after treatment.	1	2	3	4	5
e16	The application of containment programs to review the comprehension.	1	2	3	4	5
e17	To undertake special actions to examine and correct the re-submission of rejected data.	1	2	3	4	5
e18	To keep a record of mistakes during the treatment process.	1	2	3	4	5
e19	To design special programs to detect files that has been updated and are linked to the data.	1	2	3	4	5
e20	To create written procedures on how to set up data.	1	2	3	4	5
e21	To detail scrutiny of the data prior to entry.	1	2	3	4	5
e22	The preparation of manual procedures to correct data entry errors during the detection phase.	1	2	3	4	5
e23	The matching of output totals with predicted output totals.	1	2	3	4	5
e24	To check numbers after printing documents with the numbers within the program.	1	2	3	4	5
e25	To design a program to detect any unauthorized attempt to print or copy outputs.	1	2	3	4	5
e26	To establish periodic reviews of the internal control system by the Department of Internal Auditing.	1	2	3	4	5

**END OF SURVEY. THANK YOU FOR YOUR TIME**

**Appendix 2: Statistical Package for Social Sciences (SPSS)**

**Appendix 2. 1: Cronbach's Alpha for the BSC perspectives**

**1. Financial perspective**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.783	32

**2. Customers' perspective**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.590	16

**3. Internal Processes process perspective**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.590	16

**4. Learning and Growth perspective**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.637	22

**5. Internal Control perspective**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.744	26

## Appendix 2.2: One Sample T-Test

One-Sample Test						
Test Value = 3						
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
a1	19.484	210	.000	1.13744	1.0224	1.2525
a2	17.014	210	.000	1.00948	.8925	1.1264
a3	19.719	210	.000	1.15166	1.0365	1.2668
a4	17.431	210	.000	1.09005	.9668	1.2133
a5	18.383	210	.000	1.11848	.9985	1.2384
a6	16.026	210	.000	1.07109	.9393	1.2028
a7	10.436	210	.000	.66351	.5382	.7888
a8	11.764	210	.000	.77251	.6431	.9020
a9	13.146	210	.000	.89573	.7614	1.0301
a10	14.020	210	.000	.95735	.8227	1.0920
a11	16.538	210	.000	1.00000	.8808	1.1192
a12	19.427	210	.000	1.14692	1.0305	1.2633
a13	10.033	210	.000	.62085	.4989	.7428
a14	13.783	210	.000	.80095	.6864	.9155
a15	10.903	210	.000	.73460	.6018	.8674
a16	-19.966-	210	.000	-.78199-	-.8592-	-.7048-
a17	-9.555-	210	.000	-.57346-	-.6918-	-.4551-
a18	-8.726-	210	.000	-.55924-	-.6856-	-.4329-
a19	-7.285-	210	.000	-.51185-	-.6503-	-.3733-
a20	-7.572-	210	.000	-.50711-	-.6391-	-.3751-
a21	-8.994-	210	.000	-.63507-	-.7743-	-.4959-
a22	-8.841-	210	.000	-.59242-	-.7245-	-.4603-
a23	-8.919-	210	.000	-.58294-	-.7118-	-.4541-
a24	-13.124-	210	.000	-.84834-	-.9758-	-.7209-
a25	-2.512-	210	.013	-.16588-	-.2960-	-.0357-
a26	2.878	210	.004	.17536	.0552	.2955
a27	2.864	210	.005	.18009	.0562	.3040
a28	4.703	210	.000	.32227	.1872	.4574
a29	7.864	210	.000	.45498	.3409	.5690
a30	6.970	210	.000	.39810	.2855	.5107
a31	1.698	210	.091	.12796	-.0206-	.2765
a32	-2.312-	210	.022	-.10900-	-.2019-	-.0161-
b1	-11.239-	210	.000	-.75355-	-.8857-	-.6214-
b2	-12.290-	210	.000	-.75829-	-.8799-	-.6367-
b3	-14.856-	210	.000	-.85782-	-.9716-	-.7440-
b4	-18.917-	210	.000	-1.00474-	-1.1094-	-.9000-
b5	-21.170-	210	.000	-.89100-	-.9740-	-.8080-
b6	-16.820-	210	.000	-.82464-	-.9213-	-.7280-
b7	-22.876-	210	.000	-.94313-	-1.0244-	-.8619-
b8	-20.133-	210	.000	-.89573-	-.9834-	-.8080-
b9	-13.250-	210	.000	-.66351-	-.7622-	-.5648-
b10	-8.712-	210	.000	-.54028-	-.6625-	-.4180-
b11	-6.703-	210	.000	-.45972-	-.5949-	-.3245-
b12	-9.712-	210	.000	-.64929-	-.7811-	-.5175-
b13	-10.103-	210	.000	-.64455-	-.7703-	-.5188-
b14	-9.219-	210	.000	-.61611-	-.7479-	-.4844-

b15	-11.261-	210	.000	-71564-	-8409-	-5904-
b16	-14.195-	210	.000	-76777-	-8744-	-6612-
c1	4.510	210	.000	.29858	.1681	.4291
c2	9.449	210	.000	.63033	.4988	.7618
c3	13.820	210	.000	.90521	.7761	1.0343
c4	12.871	210	.000	.86256	.7304	.9947
c5	-14.541-	210	.000	-82464-	-9364-	-7128-
c6	-18.685-	210	.000	-90047-	-9955-	-8055-
c7	-18.586-	210	.000	-87204-	-9645-	-7795-
c8	-9.723-	210	.000	-62559-	-7524-	-4988-
c9	-9.249-	210	.000	-63507-	-7704-	-4997-
c10	17.996	210	.000	1.06161	.9453	1.1779
c11	13.186	210	.000	.88152	.7497	1.0133
c12	17.318	210	.000	1.04265	.9240	1.1613
c13	12.721	210	.000	.89573	.7569	1.0345
c14	10.552	210	.000	.72038	.5858	.8550
c15	-5.691-	210	.000	-34597-	-4658-	-2261-
c16	-6.556-	210	.000	-41706-	-5425-	-2917-
c17	-27.964-	210	.000	-148341-	-15880-	-13788-
c18	-24.705-	210	.000	-100948-	-10900-	-9289-
d1	3.029	210	.003	.17536	.0612	.2895
d2	-2.918-	210	.004	-18483-	-3097-	-0600-
d3	-3.817-	210	.000	-26066-	-3953-	-1260-
d4	-7.671-	210	.000	-52133-	-6553-	-3874-
d5	-3.647-	210	.000	-23223-	-3577-	-1067-
d6	2.265	210	.025	.14692	.0190	.2748
d7	-12.468-	210	.000	-80569-	-9331-	-6783-
d8	1.288	210	.199	.08531	-.0453-	.2159
d9	.749	210	.454	.05213	-.0850-	.1893
d10	-10.375-	210	.000	-68246-	-8121-	-5528-
d11	5.426	210	.000	.31754	.2022	.4329
d12	-9.651-	210	.000	-59242-	-7134-	-4714-
d13	6.349	210	.000	.36019	.2483	.4720
d14	-2.010-	210	.046	-12796-	-2534-	-.0025-
d15	2.232	210	.027	.14218	.0166	.2677
d16	-15.430-	210	.000	-90047-	-10155-	-7854-
d17	-17.828-	210	.000	-97630-	-10843-	-8683-
d18	-17.887-	210	.000	-94787-	-10523-	-8434-
d19	-17.121-	210	.000	-91469-	-10200-	-8094-
d20	-15.350-	210	.000	-90521-	-10215-	-7890-
d21	-17.770-	210	.000	-99526-	-11057-	-8849-
d22	-.446-	210	.656	-.03318-	-.1797-	.1133
e1	-1.400-	210	.163	-.09005-	-.2168-	.0367
e2	-5.725-	210	.000	-.33175-	-.4460-	-.2175-
e3	-5.604-	210	.000	-.38389-	-.5189-	-.2489-
e4	-9.024-	210	.000	-.59242-	-.7218-	-.4630-
e5	-6.129-	210	.000	-.38863-	-.5136-	-.2636-
e6	-13.602-	210	.000	-.83886-	-.9604-	-.7173-
e7	-13.626-	210	.000	-.84360-	-.9656-	-.7216-
e8	-10.849-	210	.000	-.73460-	-.8681-	-.6011-
e9	-12.335-	210	.000	-.80569-	-.9344-	-.6769-
e10	-13.366-	210	.000	-.83886-	-.9626-	-.7151-
e11	2.512	210	.013	.16588	.0357	.2960
e12	-11.061-	210	.000	-.70142-	-.8264-	-.5764-
e13	1.168	210	.244	.07583	-.0522-	.2038



e14	-2.162-	210	.032	-.13744-	-.2627-	-.0121-
e15	-1.315-	210	.190	-.09479-	-.2368-	.0473
e16	-16.418-	210	.000	-.89100-	-.9980-	-.7840-
e17	-17.142-	210	.000	-.92417-	-1.0304-	-.8179-
e18	-16.246-	210	.000	-.86730-	-.9725-	-.7621-
e19	-16.016-	210	.000	-.87678-	-.9847-	-.7689-
e20	-17.790-	210	.000	-1.00000-	-1.1108-	-.8892-
e21	-17.750-	210	.000	-.99052-	-1.1005-	-.8805-
e22	-14.785-	210	.000	-.90521-	-1.0259-	-.7845-
e23	-16.254-	210	.000	-.87204-	-.9778-	-.7663-
e24	-17.104-	210	.000	-.90521-	-1.0095-	-.8009-
e25	-18.203-	210	.000	-1.00474-	-1.1135-	-.8959-
e26	-17.353-	210	.000	-.95261-	-1.0608-	-.8444-

**Appendix 2.3: The demographic data by individual respondents from commercial banks in Jordan**

**Statistics**

		qualification	specialization	job title	yaer of experience	place of work
N	Valid	211	211	211	211	211
	Missing	0	0	0	0	0
Mean		2.0095	2.6066	2.2986	3.1611	1.8436
Median		2.0000	2.0000	2.0000	3.0000	2.0000
Mode		2.00	2.00	3.00	4.00	2.00
Std. Deviation		.21801	1.46442	.87339	1.07465	.68951
Variance		.048	2.145	.763	1.155	.475
Skewness		.796	.550	-.275-	-.419-	.303
Std. Error of Skewness		.167	.167	.167	.167	.167
Range		2.00	4.00	3.00	4.00	3.00
Percentiles	25	2.0000	1.0000	2.0000	3.0000	1.0000
	50	2.0000	2.0000	2.0000	3.0000	2.0000
	75	2.0000	4.0000	3.0000	4.0000	2.0000

**Qualification**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	4	1.9	1.9	1.9
	2.00	201	95.3	95.3	97.2
	3.00	6	2.8	2.8	100.0
	Total	211	100.0	100.0	

**Specialization**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	58	27.5	27.5	27.5
	2.00	68	32.2	32.2	59.7
	3.00	25	11.8	11.8	71.6
	4.00	19	9.0	9.0	80.6
	5.00	41	19.4	19.4	100.0
	Total	211	100.0	100.0	

Job Title					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	50	23.7	23.7	23.7
	2.00	56	26.5	26.5	50.2
	3.00	97	46.0	46.0	96.2
	4.00	8	3.8	3.8	100.0
	Total	211	100.0	100.0	

Experience in banks					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	20	9.5	9.5	9.5
	2.00	31	14.7	14.7	24.2
	3.00	71	33.6	33.6	57.8
	4.00	73	34.6	34.6	92.4
	5.00	16	7.6	7.6	100.0
	Total	211	100.0	100.0	

Experience in accounting					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	68	32.2	32.2	32.2
	2.00	109	51.7	51.7	83.9
	3.00	33	15.6	15.6	99.5
	4.00	1	.5	.5	100.0
	Total	211	100.0	100.0	

## Appendix 2.4: BSC-Perspectives

### 1. Financial perspective

Statistics						
		KPI F-1	KPI F-2	KPI F-3	KPI F-4	F
N	Valid	211	211	211	211	211
	Missing	0	0	0	0	0
Mean		4.0964	3.8436	2.3786	3.5699	3.4721
Median		4.0000	3.8889	2.4444	3.6250	3.4861
Mode		4.00	3.78 <sup>a</sup>	2.56	3.88	3.00
Std. Deviation		.59511	.48801	.59406	.55084	.33156
Variance		.354	.238	.353	.303	.110
Skewness		-.819-	-.468-	-.384-	-.845-	-.406-
Std. Error of Skewness		.167	.167	.167	.167	.167
Range		3.50	2.56	2.67	2.88	1.80
Percentiles	25	3.8333	3.5556	2.0000	3.3750	3.2361
	50	4.0000	3.8889	2.4444	3.6250	3.4861
	75	4.5000	4.2222	2.7778	3.8750	3.7188

a. Multiple modes exist. The smallest value is shown

Descriptive Statistics					
	N	Range	Mean	Std. Deviation	Variance
KPI F-1	211	3.50	4.0964	.59511	.354
KPI F-2	211	2.56	3.8436	.48801	.238
KPI F-3	211	2.67	2.3786	.59406	.353
KPI F-4	211	2.88	3.5699	.55084	.303
F	211	1.80	3.4721	.33156	.110
Valid N (listwise)	211				

## 2. Customers' perspective

		KPI C-1	KPI C-2	KPI C-3	KPI C-4	C
N	Valid	211	211	211	211	211
	Missing	0	0	0	0	0
Mean		2.1564	2.1137	2.3602	2.3213	2.2379
Median		2.2500	2.0000	2.0000	2.2000	2.1625
Mode		1.75	2.00	2.00	2.00	2.06
Std. Deviation		.48040	.41750	.58503	.57642	.30470
Variance		.231	.174	.342	.332	.093
Skewness		.284	1.723	1.281	1.175	.687
Std. Error of Skewness		.167	.167	.167	.167	.167
Range		2.00	3.67	3.25	3.40	1.87
Percentiles	25	1.7500	2.0000	2.0000	2.0000	2.0208
	50	2.2500	2.0000	2.0000	2.2000	2.1625
	75	2.5000	2.3333	2.7500	2.6000	2.4125

	N	Range	Mean	Std. Deviation	Variance
KPI C-1	211	2.00	2.1564	.48040	.231
KPI C-2	211	3.67	2.1137	.41750	.174
KPI C-3	211	3.25	2.3602	.58503	.342
KPI C-4	211	3.40	2.3213	.57642	.332
C	211	1.87	2.2379	.30470	.093
Valid N (listwise)	211				

## 3. Internal Processes process perspective

		KPI IBP-1	KPI IBP-2	KPI IBP-3	KPI IBP-4	IBP
N	Valid	211	211	211	211	211
	Missing	0	0	0	0	0
Mean		3.6742	2.2284	3.9204	2.1860	3.0023
Median		3.7500	2.2000	4.0000	2.2500	3.0000
Mode		3.50 <sup>a</sup>	2.00	4.00	2.00	2.89
Std. Deviation		.73407	.49101	.78492	.45388	.35433
Variance		.539	.241	.616	.206	.126
Skewness		-.310-	.665	-.627-	.025	-.033-
Std. Error of Skewness		.167	.167	.167	.167	.167
Range		4.00	2.80	4.00	2.00	2.20
Percentiles	25	3.2500	2.0000	3.4000	2.0000	2.7625
	50	3.7500	2.2000	4.0000	2.2500	3.0000
	75	4.0000	2.6000	4.6000	2.5000	3.2250

a. Multiple modes exist. The smallest value is shown

	N	Range	Mean	Std. Deviation	Variance
KPI IBP-1	211	4.00	3.6742	.73407	.539
KPI IBP-2	211	2.80	2.2284	.49101	.241
KPI IBP-3	211	4.00	3.9204	.78492	.616
KPI IBP-4	211	2.00	2.1860	.45388	.206
IBP	211	2.20	3.0023	.35433	.126
Valid N (listwise)	211				

#### 4. Learning and Growth perspective

		Statistics				
		KPI L&G-1	KPI L&G-2	KPI L&G-3	KPI L&G-4	L&G
N	Valid	211	211	211	211	211
	Missing	0	0	0	0	0
Mean		2.7953	2.8523	2.9455	2.1896	2.6957
Median		2.8000	2.8333	3.0000	2.1429	2.7030
Mode		2.80	2.83	3.00	2.57	2.68 <sup>a</sup>
Std. Deviation		.53610	.47522	.46354	.41666	.30479
Variance		.287	.226	.215	.174	.093
Skewness		-.046-	.135	-.211-	-.015-	-.011-
Std. Error of Skewness		.167	.167	.167	.167	.167
Range		3.20	2.67	2.25	2.14	1.42
Percentiles	25	2.4000	2.5000	2.7500	1.8571	2.4714
	50	2.8000	2.8333	3.0000	2.1429	2.7030
	75	3.2000	3.1667	3.2500	2.5714	2.8994

a. Multiple modes exist. The smallest value is shown

Descriptive Statistics					
	N	Range	Mean	Std. Deviation	Variance
KPI L&G-1	211	3.20	2.7953	.53610	.287
KPI L&G-2	211	2.67	2.8523	.47522	.226
KPI L&G-3	211	2.25	2.9455	.46354	.215
KPI L&G-4	211	2.14	2.1896	.41666	.174
LearningandGrowth	211	1.42	2.6957	.30479	.093
Valid N (listwise)	211				

#### 5. Internal Control perspective

		Statistics				
		KPI IC-1	KPI IC-2	KPI IC-3	KPI IC-4	IC
N	Valid	211	211	211	211	211
	Missing	0	0	0	0	0
Mean		2.4745	2.6264	2.2692	2.0348	2.3512
Median		2.5000	2.6667	2.4000	2.0000	2.3458
Mode		2.13 <sup>a</sup>	2.50	2.40	2.33	2.24 <sup>a</sup>
Std. Deviation		.46789	.55500	.46183	.57722	.34786
Variance		.219	.308	.213	.333	.121
Skewness		.145	.025	-.276-	.166	.348
Std. Error of Skewness		.167	.167	.167	.167	.167
Range		2.38	3.00	2.40	2.67	1.78
Percentiles	25	2.1250	2.1667	2.0000	1.6667	2.0896
	50	2.5000	2.6667	2.4000	2.0000	2.3458
	75	2.7500	3.0000	2.6000	2.3333	2.5521

a. Multiple modes exist. The smallest value is shown

Descriptive Statistics					
	N	Range	Mean	Std. Deviation	Variance
KPI IC-1	211	2.38	2.4745	.46789	.219
KPI IC-2	211	3.00	2.6264	.55500	.308
KPI IC-3	211	2.40	2.2692	.46183	.213
KPI IC-4	211	2.67	2.0348	.57722	.333
IC	211	1.78	2.3512	.34786	.121
Valid N (listwise)	211				

