AN EMPIRICAL STUDY OF THE USE OF COST ACCOUNTING SYSTEMS IN LIBYAN AGRICULTURAL FIRMS

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DOCTOR OF PHILOSOPHY
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AN EMPIRICAL STUDY OF THE USE OF COST ACCOUNTING SYSTEMS IN LIBYAN AGRICULTURAL FIRMS

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ABSTRACT

The agricultural sector is one of the important contributors to Libyan economy. Most of the agricultural firms in Libya are government-owned and recently compelled to compete with foreign companies. Available literature shows that one of the challenges faced by the government-owned agricultural firms in Libya is the ever-increasing production costs. This results in the reduction of the country's wheat production as the market price decreases. The importance of understanding the impact of the increasing costs motivates the thesis to investigate the nature of cost accounting systems in the agricultural firms which receives less attention than the manufacturing sector.

The main objective of the thesis is to examine and understand the current practice of cost accounting systems in Libyan agricultural firms. Using a mixed-method explanatory design, three instruments were used to collect the data, namely a questionnaire-based survey, interviews and documentation analysis. A total of 57 questionnaires were distributed to government-owned agricultural firms in Libya. In addition, interviews with management accountants and documentation analysis were conducted to support the findings.

A framework was developed based on the survey findings, which includes the influence of six contingent factors on the use of cost accounting systems. This study found that the firm size, cost structure, importance of cost information and legal obligation positively and significantly influence Libyan agricultural firms to use cost accounting systems. The influence of both competition and product diversity, on the other hand are not significant. The results of the study are expected to have implications for Libyan agricultural firms regarding the importance of using cost accounting systems in managing their production costs.

Keywords: Libya, traditional costing, cost accounting systems, agricultural firms.

ABSTRAK

Sektor pertanian merupakan salah satu penyumbang utama kepada ekonomi Libya. Kebanyakan firma berasaskan tani di Libya adalah milik kerajaan, tetapi sejak akhir-akhir ini telahmemaksa firma tempatanuntukbersaing dengan firma-firma asing. Kajian terdahulu menunjukkan salah satu cabaran yang dihadapi oleh syarikat berasaskan tani milik kerajaan di Libya adalah kos pengeluaran yang semakin meningkat setiap tahun. Hal ini memberikan kesan terhadap pengeluaran gandum dalam negara kerana nilai pasaran yang menyusut disamping kos pengeluaran yang semakinmeningkat. Kepentingan dalam memahami kesan peningkatan kos pengeluaran telah mendorong tesis ini untuk mengkaji sistem perakaunan kos dalam firma berasaskan tani di Libya yang kurang mendapat perhatian berbanding dengan sektor perkilangan.

Objektif utama kajianini adalah untuk meneliti dan memahami amalan semasa sistem perakaunan kos dalam firma berasaskan tani di Libya. Dengan menggunakan reka bentuk penjelasan, tiga kaedah telah digunakan untuk mengumpul data, iaitu soal selidik, temu bual, dan analisis dokumentasi. Sebanyak 57 borang soal selidik telah dihantar kepada firma berasaskan tani milik kerajaan di Libya. Di samping itu, kaedah temubual dan analisis dokumentasi juga dijalankan untuk menyokong dapatan kajian.

Satu kerangka kerja telah dibentuk berdasarkan dapatan kajian, termasuk pengaruh enam faktor penentu ke atas penggunaan sistem perakaunan kos. Kajianini mendapati saiz firma, struktur kos, kepentingan maklumat kos dan kewajipan mematuhi undang-undang adalah positif dan signifikan dalam mempengaruhi amalan sistem perakaunan kos bagi firma berasaskan tani di Libya. Tahap persaingan dan kepelbagaian produk didapati tidak signifikan. Hasil dapatan kajianini dijangka akan memberikan implikasi positif terhadap firma berasaskan tani di Libya tentang kepentingan menggunakan sistem perakaunan kos terutama dalam pengurusan kos pengeluaran.

Kata kunci: Libya, pengekosan tradisional, sistem perakaunan kos, firma berasaskan tani.

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List of Abbreviations

ABC	Activity-Based Costing
AIAEE	Association of International Agricultural Extension Education
CAS	Cost Accounting System
CASB	American Cost Accounting Standard Board
FA	Factory Automation
FAO	Food and Agricultural Organization
FMS	Flexible Manufacturing Systems
GAO	Government Accountability Office
GDP	Gross Margin Product
ICWA	Institute of Cost and Works Accountants
IMF	International Monetary Fund
JIT	Just In Time
JOC	Job Order Costing
LCC	Life Cycle Costing
MAPs	Management Accounting Practices
MAS	Management Accounting System
MOH	Manufacturing Overhead Costs
PC	Process Costing
SC	Standard Costing
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for the Social Sciences
TC	Target Costing

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This chapter aims to provide a general introduction to this thesis and includes seven sections. The first section briefly explains the importance of cost accounting systems. The second section explains the problem statement. The third and fourth sections present the research objectives and research questions, respectively. The last three sections discuss the significance of the study, the scope of the study, and finally the structure of the thesis.

1.2 Background of the Study

Accounting researchers have argued that the development of cost accounting systems is associated with the development of the industrial sector. Earlier researchers argued that the Industrial Revolution, which happened in the eighteenth century, was the starting point for cost accounting systems (Garner, 1947; Mepham, 1988; Fleischman & Parker, 1991; Fleischman & Tyson, 1993; Ning, 2005). Connecting the development of cost accounting systems with the Industrial Revolution led to most earlier researchers concentrating on the manufacturing sector's cost accounting systems (Karmarkar, Lederer, & Zemmerman, 1989; Fleischman & Tyson, 1993; Cropper & Drury, 1996; Brierley, Cowton, & Drury, 2001a; Fullerton & Mcwatters, 2004). A few researchers, such as Ittner and Larcker (2002) and Hume-Schwarz (2007), have claimed that cost accounting should be named manufacturing accounting because it serves manufacturing businesses and the production of commodities. Ittner and Larcker (2002) supported the assertion that cost accounting systems are widely used in manufacturing organizations, so accounting researchers have focused their studies on the manufacturing sector. Thus, the literature that warrants this type of study is limited; since it should be recent literature related to cost accounting systems, this explains why earlier literature is used in this study. However, Carli and Canavari (2013) stated that in recent years, researchers have shown growing interest in studying farm management information systems.

Cost accounting systems in other sectors, such as the service or agricultural sectors, have received less attention from accounting researchers than the manufacturing sector, in both past and recent research, which might be because agricultural activities remain in family firms for a long time and rely on market prices for their products' prices (Zaki, 2004). Only Arthur Young, in the eighteenth century, referred to the importance of cost accounting systems in farming (Juchau, 2002). Although accounting researchers have conducted some studies related to cost accounting systems in the service and agricultural sectors (Janet & Gus, 1996; Arnaboldi & Lapsley, 2005; Odysseas & Ioannis, 2007), the manufacturing sector has received much of the attention from accounting researchers. Nevertheless, according to Jack and Jones (2007), more studies should be conducted to understand the use of cost accounting systems in agricultural firms, to control their business and to enable them to survive in the industry.

It is argued that cost accounting systems are an important tool that offers many benefits to business organizations. Argilés and Slof (2003) claimed that there are many benefits from implementing cost accounting systems, including assisting the top management in making managerial decisions, setting products' prices, evaluating organizations' performance, cost control, and the provision of cost information for preparing financial reports. For firms that produce several products or offer many services, it is preferable to implement cost accounting systems to assist them in determining the product cost for every product or service separately, besides allocating common costs appropriately to set competitive prices (Juchau, 1986; Schoute, 2009). The use of cost accounting systems has led to scarce resources being used in an appropriate way (Juchau, 1986). It is argued that because of the benefits of cost accounting systems, it is advisable for accounting researchers to conduct more studies to understand the use of cost accounting systems in agricultural firms, to assist those firms in identifying the appropriate cost accounting systems for the agricultural business environment. Practising appropriate cost accounting will enable agricultural firms to control their costs more effectively and help them to survive in the industry with respect to reducing their product cost and increasing their profit margin (Schoute, 2009).

The agricultural sector in Libya is the second most important sector after the oil sector, and the Government relies on it to supply food for the citizens and to bring in foreign currencies by exporting the agricultural products overseas. The Libyan Government gives great importance to agricultural firms and has spent a large amount of money on the agricultural infrastructure, for example by undertaking a massive project to bring water from the south of Libya to arable land near the coast, which cost more than 30 billion US dollars (Abd-Almajeed, 2007), building modern roads to connect agricultural firms with cities, and importing developed agricultural machines and tools to increase the production (General People's Committee for Agriculture, Livestock and Marine, 2009). Agricultural firms in Libya suffer from scarce resources (Porter & Yergin, 2006); the use of cost accounting systems in Libyan agricultural firms will assist them in using these scarce resources in an appropriate way, increasing the agricultural production, and managing the money spent on them (Juchau, 1986).

Libyan agricultural firms have had to reduce their production of some crops because of the increased production cost. Zentani (2005) claimed that one of the obstacles facing barley production in Libya was the increase in the costs for local production. In addition, wheat production has been reduced due to marketing problems because of low prices in the market compared with high production costs (General People's Committee for Agriculture, Livestock and Marine, 2009). Implementing cost accounting systems would assist decision makers in making appropriate decisions that lead to lower production costs and increase the production level.

Although cost accounting systems are useful for all firms, the literature related to cost accounting systems focuses on examining the factors that influence their use in manufacturing and service firms (Karmarkar et al., 1989; Brierley, Cowton, & Drury, 2001b; Szychta, 2002; Emmett & Forget, 2005). Additionally, the literature concentrates on the adoption and non-adoption of specific cost accounting systems, for example activity-based costing (ABC) (Dekkera & Smidt, 2003; Roztocki & Schaltz, 2003). Researchers have studied the significance of cost accounting systems in manufacturing and later in service firms, while agricultural firms have not received much attention from accounting researchers. Therefore, this thesis also focuses on studying the factors that influence the use of cost accounting systems in Libyan agricultural firms, as well as on understanding the use of cost accounting systems in Libyan agricultural firms.

From the researcher's experience and other researchers' recommendations, very few studies have been conducted on the cost accounting systems in agricultural firms, although Arthur Young, in the eighteenth century, advocated that farmers should use cost accounting systems (Argilés & Slof, 2001; Juchau, 2002; Athanasios, Stergios, & Laskaridou, 2010). Athanasios et al. (2010) claimed that accounting researchers, practitioners, and standard setters have not paid much attention to cost accounting systems in the agricultural sector. Jack and Jones (2007) argued that management accounting in farming has received very little attention from accounting researchers. Jack and Jones (2007) also claimed that nowadays, the agricultural sector is facing significant changes and adjustments, such as changes in the cost structure, the use of developed technology, and volatility of the prices of raw materials. Jack and Jones (2007) asserted that these changes can bring about changes in accounting uses in agricultural firms.

Furthermore, the USA's Government Accountability Office (GAO, 2006) recommended the use of proper accounting methodologies to inform pricing and managerial decisions in the agricultural sector. The GAO emphasized the need for cost information in the agricultural sector, as well as the development and reporting of cost information. Besides, accounting researchers have argued that assisting farmers in using management accounting tools will help them to be self-sustainable (Argilés & Slof, 2001; Juchau, 2002; Athanasios et al., 2010), while Foong and Teruki (2009) encouraged accounting researchers to study the use of cost accounting systems in agricultural firms; Foong and Teruki (2009) claimed that if plantation firms are able to align the cost accounting system design with their strategy and goals, they will benefit from cost information.

Moreover, the Association of International Agricultural Extension Education (AIAEE) encouraged agricultural education and agricultural cost accounting as part of agricultural education. Based on previous recommendations from several accounting researchers, this thesis focuses on Libyan agricultural firms to understand the use of cost accounting systems in those firms and to determine the factors that influence them to implement cost accounting systems.

1.3 Problem Statement

Agriculture is one of the oldest and most important forms of organized human activity (McLean, 2008). According to the Food and Agriculture Organization (FAO) statistics, at the start of the new millennium, about 2.57 billion people depended on agriculture, hunting, fishing, or forestry for their livelihood. Agriculture powers the economies of most developing countries. Even in industrialized countries, agricultural exports alone were worth about US$290 billion in 2001, and few developed countries experienced rapid economic growth and poverty reduction that had not been either preceded or accompanied by agricultural growth (Wong, 2007). If countries want to work their way out of poverty or hunger for poor or undernourished people, the most likely place to earn money in rural areas is in a flourishing agricultural sector (Cervantes-Godoy & Dewbre, 2010).

In spite of the importance of agriculture to the economy of many countries, and its growing interrelationships with other sectors, agriculture has not received much attention from accounting researchers or from practitioners (Athanasios et al., 2010). On the other hand, the current accounting principles typically do not respond very well to the particular characteristics of agricultural business and the information needs of farmers, such as biological assets, the valuation of which is difficult and controversial (Tahir et al., 2004).

The agricultural sector provides raw materials to other sectors, like the industrial sector. Various industries need raw materials from the agricultural sector; for example, the cotton textile industry needs raw cotton, while the tyres and tubes industry needs natural rubber. This sector also provides governments with foreign exchange by exporting agricultural products overseas, especially to those countries that do not have alternative resources of foreign exchange, such as oil and tourism. Even in developed countries, like the European countries, for instance Italy and Spain, agriculture is important. According to Argilés and Slof (2003), agriculture is an important component of the European Union's economy.

Agriculture in Libya has been a vital sector for more than a hundred years. When the Garamantes lived in the south of Libya, their economy depended on agriculture. In the same era, Romans lived in the west of Libya. They considered the north-west of Libya to be the breadbasket of the Roman Empire (Michael, 2009; Josh, 2010). In the north-east of Libya, the Phoenicians lived and relied on agricultural activities. Some cities, such as Tripoli and Sabratha, grew immensely rich and from that time until the middle of the last century, the agricultural sector was a significant source of national income. In addition, half of the Libyan population was working in agricultural activities until 1960 (Porter & Yergin, 2006).

The discovery of oil in 1959 had a great impact on the agricultural sector, making it the second most important sector in Libya (Alsabbag & Alseheri, 1992). This caused the Government to switch its attention to oil production. However, agriculture in Libya is still a crucial sector, although its contribution to the national income has declined. In 1954, its contribution was 26% (Gandeel, 1978; Helen, 1987). This percentage decreased after oil was discovered and further declined to 5.6% in 1997 and 2.1% in 2007. However, the agricultural sector contributed 8.2% to the national income in 2009, as a result of the Government's orientation towards the diversity of national income sources.

Nowadays, Libya subsidizes agricultural firms with billions of dinars (General People's Committee for Agriculture, Livestock and Marine, 2009); over the last three decades, Libya has spent 5.5 billion dinars on the agricultural sector and the Libyan Government set a five-year plan from 2006 to 2010, allocating 3.3 billion dinars to supporting the agricultural sector, 1.2 billion dinars to supporting local farmers in terms of loans, and 2.1 billion dinars for the development of the agricultural infrastructure. Although the Libyan Government is spending billions of dinars on the agricultural sector, Porter and Yergin (2006) argued that the Libyan agricultural sector is suffering from low agricultural productivity. Porter and Yergin (2006) justified the low productivity as being due to a lack of experts in management, resulting in inefficient management of scarce resources and inefficient decisions related to investment in technology and irrigation equipment.

The General People’s Committee for Agriculture, Livestock and Marine (2012) reported that the declining production and low productivity were due to the increase in the production cost, the decrease in selling prices, and the difficulties in marketing. Furthermore, Zentani (2005) claimed that one of the constraints facing barley cultivation in Libya is the high costs for local production. According to the General People’s Committee for Agriculture, Livestock and Marine (2012), wheat production has decreased because of marketing problems due to low prices in the market compared with high production costs, whereby in 1985 Libyan agricultural firms produced 210,000 tons of wheat, whereas in 2005 the amount decreased to 67,000 tons. Therefore, using cost accounting systems in an appropriate way will help decision makers in Libyan agricultural firms to make better decisions in terms of using scarce resources, making investment decisions, and reducing the production costs.

The Libyan Government encourages investment in farming; for instance, in 1993, the Libyan Government invested 49.88% of its budget in the agricultural sector. Moreover, it announced Law No. 5 – “Encouragement of Investment Decision” (General People's Committee, 2006), which indicates the Libyan Government’s intention to diversify its sources of income. The first sector targeted under this law was the agricultural sector – to reduce the importing of agricultural products, especially since Libya imported 75% of its food requirements (Porter & Yergin, 2006). Libya has also undertaken a massive project called “the industrial river” or the Great Man-Made River (GMR) to irrigate many agricultural firms’ land in northern Libya. This project cost about 30 billion dollars to transfer water from the south to the north of Libya (Abd-Almajeed, 2007).

Although agricultural firms in Libya are very large, covering an area of 3,600,000 acres of arable land (Gandeel, 1978) and producing massively, they do not pay attention to cost accounting systems in their decision-making processes and cost reduction and cost control, like other sectors. Juchau (1986) argued that in large, multi-product agricultural firms, the need for cost accounting systems for decision making is obvious. Agricultural firms in the Libyan public sector aim to produce many products, including cereals, fruits, and vegetables, and to engage in animal husbandry. Therefore, managers need cost information to make managerial decisions related to their firms. In addition, after the United Nations (UN) cancelled the economic sanction in 2003 (IMF, 2006), many companies entered Libya to invest in all the sectors, including the agricultural sector. According to the EC (2009), Italy invested €500,000 in the Libyan agricultural sector in 2006. In addition, several companies from the USA have invested in agricultural firms (General People's Committee for Agriculture, Livestock and Marine, 2012). This means that the circumstances have changed from a monopolistic environment to a competitive environment in the agricultural sector; according to Tani (1995), companies in any sector that work in an intensively competitive environment have to use cost accounting systems to be able to survive. Aljazawe (2006) argued that although agricultural firms in Libya are large firms and produce several types of products, they also face competition from foreign companies, and they depend on simple information for decision making. Besides, they are facing several accounting problems; therefore, it is hoped that accounting researchers will conduct more research in the agricultural sector.

Geiger and Ittner (1996) argued that the organizations in the public sector often use cost accounting systems to meet external requirements. However, the use of such systems for internal purposes is minimal. In recent years, the Libyan Government began to decrease the subsidies for agricultural firms, including the payment to cover any losses faced by them (General People's Committee for Agriculture, Livestock and Marine, 2012). This action led to the increased importance of cost information for agricultural firms to be able to survive and compete with foreign products. On the other hand, cost accounting systems control the use of scarce resources to make sure that the best returns are received from the use of those resources (Juchau, 1986; Hume-Schwarz, 2007). As argued by Porter and Yergin (2006), arable land and water are considered to be scarce resources in Libya; therefore, paying more attention to cost accounting systems may enable the control of those resources and their proper usage.

The preliminary literature review related to cost accounting systems in agricultural firms in Libya and the researcher's own experience suggested that cost accounting in farming does not receive as much attention as that in other sectors (Jack & Jones, 2007). In addition, there is a lack of research in this area. The importance of cost accounting information in planning, controlling, and decision making in manufacturing and service firms has led us to think of the importance of the role of cost accounting information in Libyan agricultural firms.

The agricultural sector can gain many advantages from the use of cost accounting systems. It helps in making better administrative decisions in several ways, one of which is allocating overhead costs to cost centres in the fields, especially if a farm plants different types of crops and uses many kinds of machines. Cost accounting opens up new ways of looking at farming operations. It can provide a breakdown of income and expenses by acre and yield units and enables farmers to compare the performances of different fields, determine why one block of land may be producing more than another, and analyse the optimal use of land. According to Jack and Jones (2007), farmers who use cost accounting systems will perform better than farmers who do not.

Because there are no appropriate cost accounting systems suitable for all organizations, as referred to by the contingency theory (Pavlatos & Paggios, 2009), there is a need to study the use of cost accounting systems in agricultural firms, due to most prior studies focusing on the use and the factors that influence the use of cost accounting in manufacturing firms. Therefore, this thesis emerges as one of the very few studies to investigate the use of cost accounting systems in agricultural firms, especially in Libya.

1.4 Research Objectives

This thesis has one main objective and five sub-objectives, as presented below:

The main objective is:

- To examine and understand the use of cost accounting systems in Libyan agricultural firms.

The sub-objectives are:

1. To ascertain whether Libyan agricultural firms use cost accounting systems.
2. To identify the extent of use of cost accounting systems in Libyan agricultural firms.
3. To examine the factors that influence the use of cost accounting systems in Libyan agricultural firms.
4. To investigate how Libyan agricultural firms allocate their overhead costs.
5. To investigate how Libyan agricultural firms calculate their product costs.

1.5 Research Questions

The main question for the thesis is:

- How do Libyan agricultural firms use cost accounting systems?

To be able to answer the main question, the following sub-questions are presented:

1. Do agricultural firms use cost accounting systems?
2. To what extent do agricultural firms use cost accounting systems?
3. Which factors influence the use of cost accounting systems in Libyan agricultural firms?
4. How do agricultural firms in Libya allocate overhead costs to their products?
5. How do agricultural firms in Libya calculate their product costs?

1.6 Significance of the Study

Although many studies have been conducted in the field of cost accounting systems, most of them have concentrated on the manufacturing and service sectors, while the agricultural sector has been almost neglected in the cost accounting literature. Moreover, the prior studies have focused on the factors that influence the manufacturing and service firms to use cost accounting systems, while few studies have paid attention to the use of costing systems in agricultural firms. Furthermore, most of these studies relied on the quantitative or qualitative method, whilst a few studies depended on the mixed-method design. In brief, the importance of this research is summarized in the next page:

1. This thesis explains to agricultural firms' managers the importance of cost accounting systems in making managerial decisions, cost control, and determining the product costs, which will help them to set competitive prices.

2. This thesis is a starting point for other academics to conduct similar studies on agricultural firms, by adding new factors or using other methodologies, such as a case study.
3. The findings of this thesis portray the use of cost accounting systems in Libyan agricultural firms. From the findings, the researcher intends to suggest the best cost accounting systems for Libyan agricultural firms.

1.7 Scope and Limitations of the Study

This thesis focuses on understanding the use of cost accounting systems in Libyan agricultural firms. In terms of identifying the extent of use of cost accounting systems in Libyan agricultural firms, it investigates the contingent factors that influence their use of cost accounting systems, how they allocate indirect costs, and how they calculate their product costs. The data are limited to Libyan agricultural firms in the public sector, for which questionnaires were used and supplemented by interviews conducted with managers, management accountants, financial accountants, and production managers, to understand how Libyan agricultural firms use cost accounting systems. This thesis used mixed methods to achieve its objectives, using the questionnaire to collect data related to the factors that influence the use of cost accounting systems, while personal interviews were conducted to collect data related to how Libyan agricultural firms use cost accounting systems.

1.8 Research Process

Figure 1.1 explains the steps that the researcher followed to achieve the study's objectives, starting with the introduction to the research problems; then, the researcher reviewed the literature to identify the gaps in the literature and to choose an appropriate research design to help in collecting and analysing the research data. Next, appropriate factors for the study were selected from the accounting literature. Providing an overview of the Libyan agricultural sector was the fourth step; the fifth step was to determine the research methodology, including the research design and data collection instruments. Next, the research data were analysed, followed by the writing of the research findings and the research discussion.

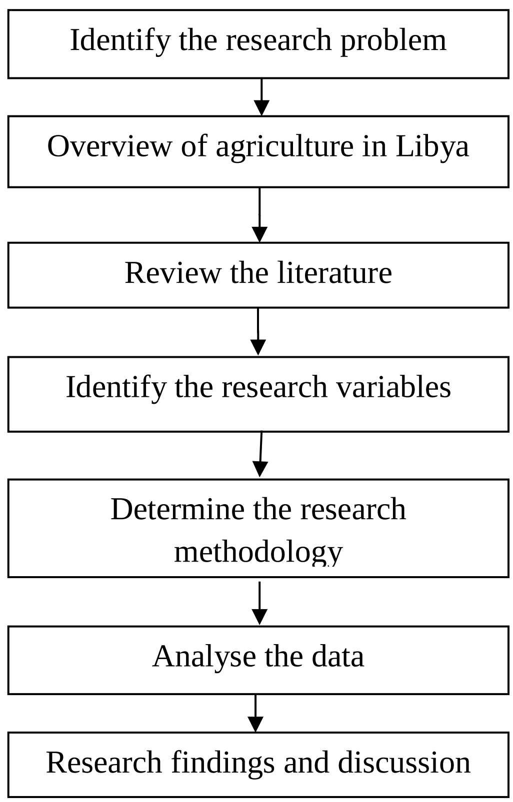

Figure 1.1
Research Process
Source: Creswell and Clark (2010)

1.9 Structure of the Thesis

Besides this introductory chapter, this thesis consists of a further six chapters, organized as follows. Chapter Two focuses on the agricultural sector in Libya; this chapter starts with the definition of agriculture, followed by the agricultural history in Libya. A brief explanation of agricultural production processes for plantation is included in Chapter Two as well. It shows in numbers how much the Libyan Government has spent on the agricultural sector, and the main agricultural firms and products are presented. Moreover, Chapter Two sheds light on an example of an organizational structure in Libyan agricultural firms.

Chapter Three reviews the literature related to cost accounting systems, including the concepts of cost accounting systems, the significance of cost accounting systems, some cost accounting systems, and a summary of cost accounting in manufacturing, service, and agricultural firms.

Chapter Four describes the research methodology; it provides detailed information about the research design, research questions, research framework, and research hypotheses. In addition, Chapter Four introduces the data collection tools (questionnaire, semi-structured interview, and documentation analysis), and the validity and reliability of the questionnaire are tested in Chapter Four as well. Furthermore, the research population and sampling, measurement of the research variables, and data analysis techniques are also explained in Chapter Four.

Chapter Five presents the data analysis from the interviews and questionnaires. The data collected from the interviews and documents were analysed manually, whereas several statistical tests were used to analyse the data collected from the questionnaire, that is, reliability, normality, factor analysis, correlation, multiple regressions, etc. This chapter presents the findings of the thesis. Chapter Six discusses the findings obtained in Chapter Five.

Finally, Chapter Seven presents the research's conclusion, including its contributions to knowledge and practice, and suggests several recommendations for future research, explains the limitations of the study, and presents the study's conclusion.

CHAPTER TWO
OVERVIEW OF AGRICULTURE IN LIBYA

2.1 Introduction

This chapter provides an overview of the agricultural sector in Libya, starting with the definition of agriculture and moving on to the history of agriculture in Libya from 630 BC until the present. The agricultural production processes are also discussed. This chapter focuses on all the subjects related to agriculture in Libya, such as agricultural production, arable land, and agricultural expenditure. Table 2.1 defines some of the important terms used in Chapter 2.

Table 2.1
Definitions of the Key Terms Used

Concepts	Author's definitions
Agricultural firms	All firms involved in farming and rearing animals to produce agricultural products.
Fezzan	Before 1950, it was one of the three independent states that now constitute Libya.
Garamantes	A group of people who lived in the south of Libya before the third century.
Arable land	Fertile land suitable for agriculture.
Plantation products	All products that come from plants, including cereals, fruits, vegetables, and legumes.
Livestock	All animals that can be used by human beings to produce food or any useful products.

2.2 Definition of Agriculture

Agriculture is considered to be one of the oldest occupations practised by human beings (McLean, 2008). In the early ages, people moved from place to place as they did not have permanent homes. Food (meat, vegetables, fruits) was obtained directly from nature by hunting animals and collecting vegetables and fruits that grew naturally in jungles. However, when people settled in one place, they discovered the value of food and they decided to rely on their ability to benefit from the surrounding environment by growing different types of plants and keeping animals instead of hunting them (Wood & Lenne, 1999). The available literature related to agriculture indicates that agriculture has many meanings, including planting several types of vegetables and fruits or rearing animals to use their skin as clothes, drink their milk, and eat their meat, besides keeping birds, such as hens, for their eggs and meat. According to Mohamed (1996), agriculture can be defined as follows: “Agriculture means cultivation or plantation and other operations help in increasing agricultural production, it means growing plants and animals”.

Researchers and scientists have not been able to determine when agriculture formally started and agree on its definition. Mostfa (1979) defined agriculture as the process of using land, water, and human and capital resources in the agricultural sector as production units to produce plants and animals to offer food, clothes, and raw materials to the industrial sector as well as for exporting. Similarly, Mahmod (1997) argued that there are two definitions of agriculture. The first one is the literal definition: agriculture consists of two parts, “agri”, which means field or soil, and “culture”, which means cultivation or tilling the land. The second definition is a technical definition that means using a group of processes to find a suitable environment to grow plants and perform animal husbandry. Preparing a suitable environment includes cultivation, sowing, irrigation, pest control, fertilization, and land reclamation. Agriculture consists of three main activities: plantation, livestock, and fishery. Figure 2.1 below illustrates these activities. Some researchers have excluded fishery and substituted it with agricultural industry.

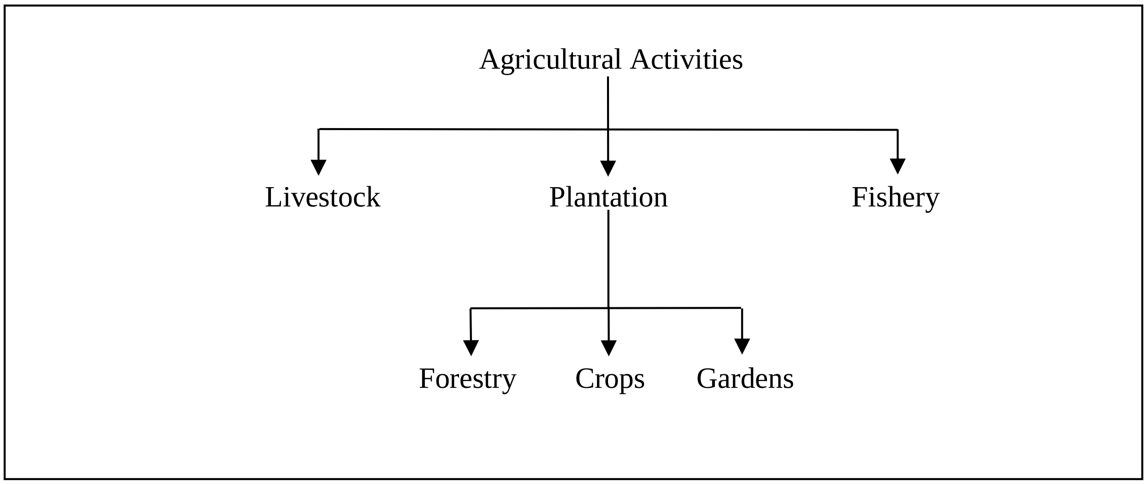

Figure 2.1
Agricultural Activities
Source: Zaki (2004, p. 1)

2.3 Agricultural History in Libya

Farming is the oldest activity in Libyan history. Before Libya was founded, in 630 BC, northern Libya belonged to many races, which included the Greeks, who lived in the east of Libya in cities such as Cyrene and Apollonia, now known as Shahat and Sosa. Agriculture in this era flourished and the economy depended on farming and grazing. The climate and soil were suitable for these activities, and the land was able to grow almost anything. From 1000 BC to 200 BC, Phoenicians lived in Oea, now known as Tripoli. Agricultural activities continued to flourish, with the economy relying on farming and grazing. The most important crops were cereals, palms, and olives; the Phoenicians also grazed animals, such as sheep and goats.

Michael (2009) claimed that the Romans regarded the north of Libya as the breadbasket of the Roman Empire. In some cities, such as “Leptis Magna”, which is now called Sabratha, the Romans grew immensely rich (Josh, 2010). Agriculture relied on a complex system of rain for irrigation. Therefore, large portions of the population were pastoralists or farmers. In addition, a famous Roman leader called Septimius Severus, who was of Libyan origin with Romanian nationality, encouraged farmers to cultivate their land and provided them with all the support they needed (Ahmad, 2010).

In the same era, the Garamante Empire was located in the south of Libya, and these people also depended on agriculture (Mattingly, 1996). They used a developed system of irrigation, consisting of underground channels to drain water from wells to irrigate their plants and trees, because the climate was so hot; therefore, using this irrigation system helped to prevent the water from evaporating. Besides, due to the lack of rain, they used underground water for their plantation.

Later, during the Turkish colonial period in Libya from 1551 to 1911 (Inderwasin, 2008), the revenue depended on agricultural resources. The Government enforced laws in Tripoli to promote agriculture in Libya. New crops, such as potatoes, coffee, cotton, oranges, and many kinds of trees, were introduced besides the cultivation of palms, olives, grapes, almonds, and barley. The Government also stressed agricultural education and hence built new agricultural villages. In addition, they encouraged people to grow palm and olive trees and built many dams to keep rainwater in winter to irrigate the fields in summer when the rain level decreased. The Government also established a new agricultural bank to finance and provide loans for farmers (Mohamed, 1991). They established an agricultural school in 1909 for the purpose of training farmers in the modern methods for farming and to produce new generations of young farmers (Tawer, 1991). Training farmers to use modern farming methods and irrigation systems would lead to better results in using resources and producing low-cost products; these results are consistent with McBride (2003), who found that more educated farmers are more capable of adopting modern technologies that might decrease the product costs and increase the farm productivity.

Following the Libyan independence in 1951, before the discovery of oil in 1954 and during the reign of King Idrees, the Libyan economy was fully dependent on agricultural products; besides, most Libyan citizens worked in one of the agricultural activities (farming crops, planting palm and olive trees, grazing animals). During King Idrees's era, agriculture was considered as the principal means of livelihood for most Libyans who lived in rural areas. In addition, farming contributed 26% of the GDP (Helen, 1987). However, after the discovery of oil, the Government paid more attention to the oil sector. Libyan citizens also preferred to work in oil companies, because they only worked for a few hours and received more money. As a result, many farmers left the agricultural sector and migrated from rural areas to cities where they could work in the oil industry, which then affected the agricultural production. Consequently, Libya started importing agricultural products that much earlier it had been exporting. The Libyan authorities became aware of this problem and therefore encouraged people to return to agricultural activities.

The Government supported the agricultural sector and farmers in particular. The first step was to establish an agricultural bank in 1955. The bank started its operations in 1957 (Agribank, 2010). This bank aims to give loans (cash and assets) to farmers and associations involved in farming.

During Muammar Gaddafi's regime, the Government of Libya paid more attention to farming and farmers, whereby 25% of the Libyan budget between 1970 and 1971 was allocated to farming, whereas in 1993, the Libyan Government invested 49.88% of its budget in agriculture (Bureau of Economic, Energy and Business Affairs, 2009). The main purpose of the agricultural development at that time was the attainment of self-sufficiency in food products, especially wheat, barley, and meat. From 1981 to 1985, the agricultural development became the cornerstone of the development plan (Helen, 1987).

Libya faced many difficulties in the agricultural sector, such as a lack of water resources and arable land. To overcome the water problem, the Libyan authorities started a major project in 1984 to transport underground water from the basins in the south of Libya (Tazerbo, Sarir, and Jabl Alhassawna) to the north of Libya (Tripoli, west Benghazi, Sirte, and Ajedabya). This project was called the "Great Man-Made River" (Kuwairi, 2006). The south of Libya consists of the Sahara Desert; however, some areas are considered arable land but relying on the agricultural firms in the south of Libya will not provide enough food for Libyan citizens. On the other hand, in the south of Libya, there is a huge amount of underground water. According to Kuwairi (2006), the underground water came from tropical rain 14,000–38,000 years ago. In the north of Libya, most of the lands are arable lands, but the north of Libya suffers from a lack of water. The project, which involved transferring 6 million cubic metres of water every day, was completed using pipes that were almost 3,380 km long. This project consumed 250,000 pipes, each 7.25 m long with a diameter of 4 metres. The cost of the project was 30 billion dollars (Abd-Almajeed, 2007). Although this project cost the Libyan Government billions of dollars, it contributed by reducing the irrigation water costs in coastal areas from USD 0.90/m^3 to USD 0.03/m^3 (Porter & Yergin, 2006).

2.4 Agricultural Firms in Libya

In this section, the public agricultural firms in Libya are reviewed. These firms are located in different parts of Libya, as shown in Figure 2.2 below. Brief information about some agricultural firms is then provided.

Figure 2.2
Agricultural Firms' Locations (Green Areas)
Source: Food and Agriculture Organization (FAO)

The agricultural firms in Libya consist of two sectors: the public and private sectors. According to the General People's Committee for Agriculture, Livestock and Marine (2009), the farm size in the private sector should be ten acres or less and the public sector has two types of agricultural firms: settlement firms, which are exactly the same as private firms in size, and agricultural firms, which are larger than private firms. Moreover, as stated by M. Abdullah (Personal communication, 5 February 2012), some of the Libyan agricultural firms receive a full subsidy, while other do not receive a subsidy from the Libyan Government; however, all the Libyan agricultural firms started with a full subsidy from the Libyan Government to establish the firm, and then the subsidy was removed gradually when the firm commenced producing and marketing the products. In this thesis, the researcher studies the use of cost accounting in agricultural firms in the public sector; the next paragraphs provide brief information on some Libyan agricultural firms.

The first one is the Slgodh agricultural project. This project was established in 1973, 80 km east of the capital city of Libya (Tripoli). It is located in an area of 9,000 sq km and employs 98 workers. Its irrigation depends on the pivot irrigation system. This firm aims to produce cereals (barley and wheat) as the main product and rears animals as an additional activity. In 2007, the total productivity per hectare of barley was 2.7 tons. Second, the Mknusha agricultural project, established in 1979, lies 1,100 km south of Tripoli. This firm aims mainly to produce cereals (wheat, barley, yellow corn and sweetcorn, and forage) and has 349 workers in different areas. The farm size is 4,189 acres divided into many fields of different sizes – 40 acres, 50 acres, and 60 acres. These fields rely on 117 wells to provide them with water for the pivot irrigation system. Third, the Barjuj agricultural project is located 950 km south of Tripoli in an area of 3,650 acres. This firm was set up in 1987 to produce cereals (barley, wheat, and forage) and employs 350 workers; it contains 73 fields, each field being 50 acres, relying on the pivot irrigation system, which derives water from 87 wells.

The fourth, the Aldboat agricultural project, was established in 1987 on an area of 5,000 acres, 700 km south of Tripoli, with 100 employees; it produces mainly cereals and rears animals as an additional activity. It consists of 22 fields deriving water from 34 wells, and the total productivity per hectare of wheat was 5.424 tons and of barley was 4.523 tons in 2008.

The fifth, the Abusciba agricultural project, located south of Tripoli, was established in 1980 on an area of 2,100 acres, with 91 employees producing cereals and rearing animals; it includes 21 fields of different sizes – 70, 56, and 47 acres. In 2007, the productivity per hectare of barley was 3.373 tons and per hectare of wheat was 2.985 tons. The sixth is the Deeseh agricultural project – this firm is located 1,350 km south of Tripoli on an area of 1,430 acres, and 100 workers run the firm to produce cereals and rear animals. It includes 65 fields of different sizes – 20 and 50 acres – which rely on the pivot irrigation system. The productivity per hectare of barley in 2008 was 4.180 tons. The seventh consists of the Asalol green projects – these firms are located beside the Libyan coast, and their aim is to farm 469,240 acres of cereals. The irrigation system relies on the Great Industrial River. Asalol's green projects include ten agricultural firms: the Wadi Garf agricultural project, Zalla agricultural project, Zamzam agricultural project, Sof Aljeen agricultural project, Abo Ganeem agricultural project, Sultana agricultural project, Aljfra agricultural project, Bin Jawwad agricultural project, Mraee Sert agricultural project, and Alwashkh agricultural project.

The Alweeg agricultural project was established in 1989 and is located 1,600 km south-east of Tripoli on an area of 5,100 acres, with 250 employees working in 4 agricultural firms. The aim is to produce cereals, olive oil, and palm dates in three branches: Tmessa agricultural firm, Algatron agricultural firm, and Majdol agricultural firm. Algarapoli agricultural firm was established in 1974 on an area of 10,552 acres and its goal is to produce cereals; therefore, it is separated into 375 acres to produce wheat, 300 acres to produce barley, 170 acres to produce oats, and 140 acres to produce legumes. In addition, it includes 50,000 almond trees and 100,000 grape trees. A summary of the 57 agricultural firms is provided in Table 2.2.

Table 2.2
Libyan Agricultural Firms

No.	Firm	Location	No.	Firm	Location
1	Slgodh	West of Libya	30	Fam Alga	West of Libya
2	Abusciba	West of Libya	31	Alassa	South of Libya
3	Besher	West of Libya	32	Zamzam	South of Libya
4	Beer Ganam	West of Libya	33	Sof Aljeen	West of Libya
5	Bader	West of Libya	34	Abo Najeem	West of Libya
6	Algsa	West of Libya	35	Darna	East of Libya
7	Alhadba Alkaddra	West of Libya	36	Aljfra (west)	South of Libya
8	Kaam	West of Libya	37	Garb Sert	West of Libya
9	Al Affia	West of Libya	38	Gararat Algatf	West of Libya
10	Abo Aisha	West of Libya	39	Gandoba	South of Libya
11	Marada	West of Libya	40	Almargb	South of Libya

Table 2.2 (Continued)

No.	Firm	Location	No.	Firm	Location
12	Harawa	West of Libya	41	Teshina	South of Libya
13	Mknusha	South of Libya	42	Algarapoli	West of Libya
14	Barjuj	South of Libya	43	Wadi Alord	West of Libya
15	Aldboat	South of Libya	44	Tawarga	East of Libya
16	Deeseh	South of Libya	45	Alsahabi	East of Libya
17	Alweeg	South of Libya	46	Gadams	East of Libya
18	Alariel	South of Libya	47	Wadi Albab	East of Libya
19	Tssawa	South of Libya	48	Got Alsultan	East of Libya
20	Aerown	South of Libya	49	Sabha	South of Libya
21	Tahalah	South of Libya	50	Alwahat	South of Libya
22	Alkofra	South of Libya	51	Aljofra (east)	South of Libya
23	Morzqe	South of Libya	52	Wadi Almardom	West of Libya
24	Alsareer	South of Libya	53	Tarhona	West of Libya
25	Abonajaam	South of Libya	54	Jallo	South of Libya
26	Alagorea	East of Libya	55	Bengazi	East of Libya
27	Tagmot	East of Libya	56	Altosh	South of Libya
28	Alhera	East of Libya	57	Wadi Albelad	South of Libya
29	Asalol	West of Libya			

Source: General People's Committee for Agriculture, Livestock and Marine (2012)

2.5 Organizational Structure in Libyan Agricultural Firms

Agriculture in Libya was the main income source for almost all Libyan citizens before the discovery of oil in 1959 (Hallett, 2002). All of them relied on one or two types of agriculture, plantation, livestock, or fishery. Libyan citizens who live beside the Libyan coast depend on fishing and growing olive trees and some fruits, such as grape, oranges, figs, almonds, cacti, apple trees, and many types of vegetables. They also graze animals, for instance, cows, sheep, and goats. In central areas, they depend on grazing camels, goats, and sheep. In the south, they plant date palm trees, grow vegetables, and graze camels and sheep. In the past, every family used to own a farm to produce for domestic consumption and sell the extra. Therefore, most Libyan citizens nowadays have farms, but most of them keep their farms just because of the social culture, not for production. Agriculture in Libya is divided into three groups: 1) family farms producing for domestic consumption (ten acres or less); 2) settlement agricultural firms – these firms were established by the Government and then distributed to citizens with the aim of stopping immigration from rural areas to the main cities; and 3) agricultural production firms that belong to the Libyan Government and are located on large areas of between 3,000 acres and 10,000 acres.

Some of the agricultural firms depend on rain to irrigate their fields, especially those located in the northern area because the rain level in that area is between 150 and 450 mm, sometimes reaching 550 to 600 mm (Gandeel, 1978). They do not have complicated irrigation systems. However, agricultural firms located in southern and central Libya rely on underground water as those areas receive almost no rain, but there are underground lakes. Therefore, the Government drilled wells and connected them to the irrigation system, drip system, or pivot irrigation system. The first type usually does not have an irrigation department, while the second type must have this department; hence, this system will entail more costs for those firms. Although agricultural firms in Libya have different organizational structures, most of them have an organizational structure as shown in Figure 2.3, derived from the Barjuj agricultural project. This firm is located in the southern area of Libya, 950 km south of Tripoli.

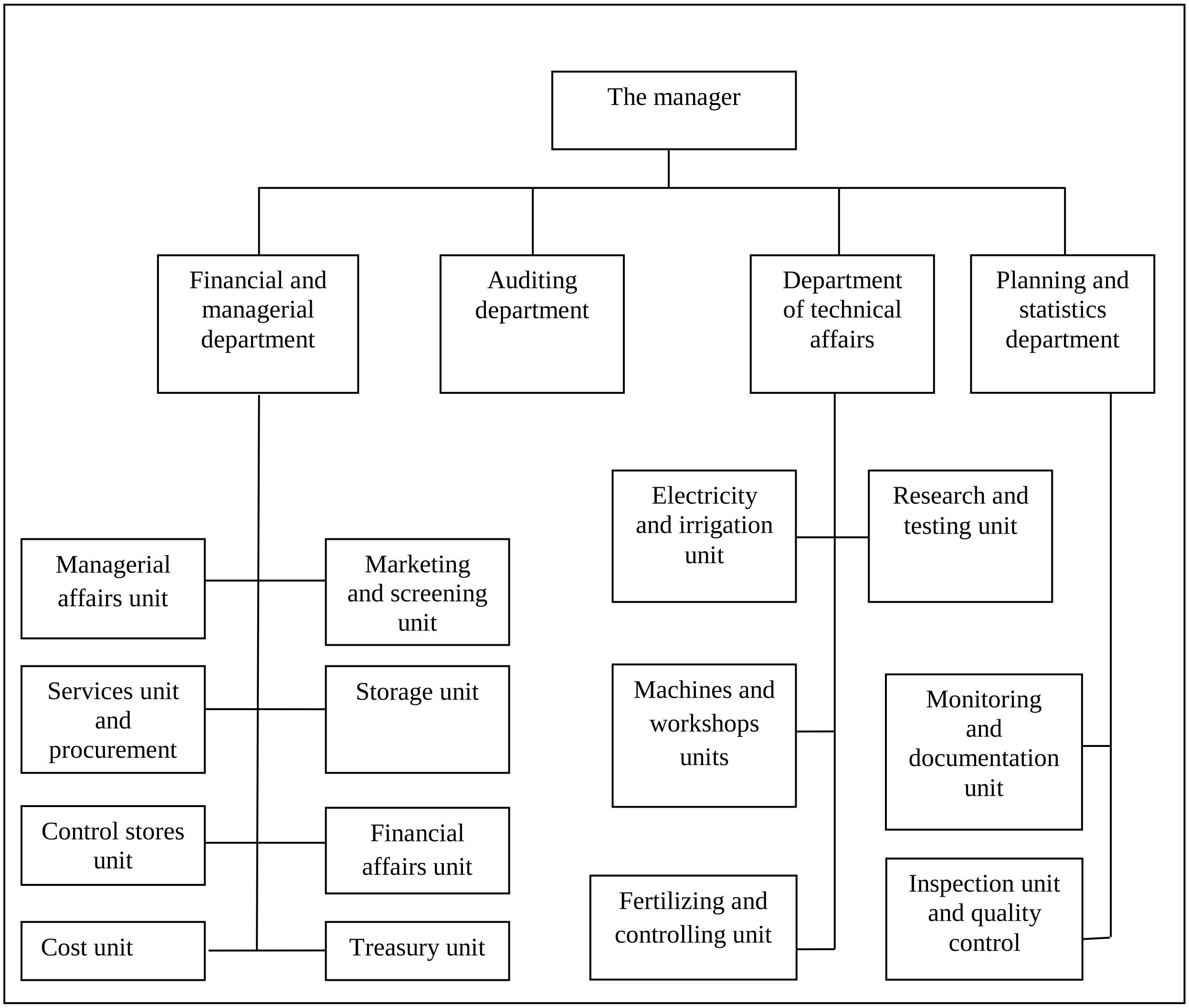

Figure 2.3
Organizational Structure
Source: Barjuj agricultural firm

On the other hand, the irrigation department differs from one firm to another and depends on how many units the firms have; for instance, in Barjoj, there are three irrigation areas, as shown in Figure 2.4.

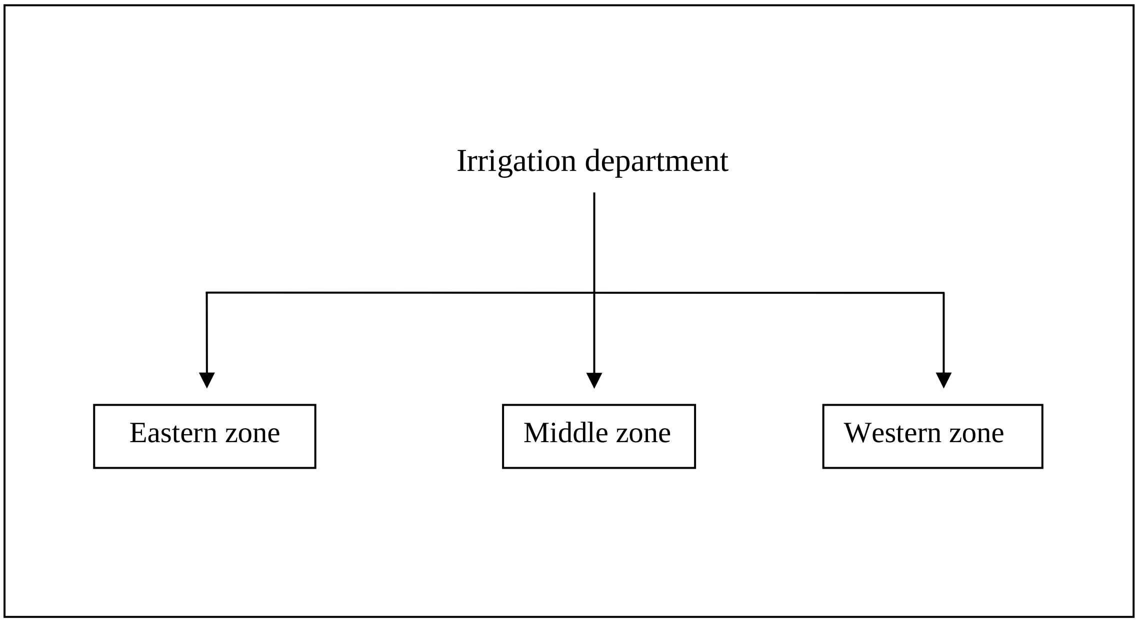

Figure 2.4
Irrigation Department in Barjoj Firm
Source: Barjuj agricultural firm

Every zone has 20 units of the pivot irrigation system; each unit's size is 50 acres. The Barjuj agricultural project has two production departments: the plantation department, which produces cereals (barley and wheat), and the livestock department, which focuses on sheep rearing. With respect to the determination of costs, every department has its own workers and machines. Therefore, there are no joint costs for workers and machines. The only joint costs are the administrative and service costs.

Libyan agricultural firms determine their product costs for cereals by determining the cost of one acre. They gather all the expenses of the plantation department, such as workers' salaries, seeds, fertilizers, pesticides, electricity, and depreciation of machines, and then divided all those costs by the number of acres that they have to find out the cost of one acre. To determine how much one ton costs, they divide the cost of an acre by the number of tons that the acre produces. The irrigation department of the Deeseh agricultural firms located 1,100 km south of Tripoli differs from that of the Parjoj firm. Here, there are five zones and every zone produces different products – cereals, fruits, vegetables, flowers, ornamental trees, and green pastures – as shown in Figure 2.5, whilst in Parjoj, all three zones produce cereals. The livestock department is also different: in the Parjoj firm, there is one kind of livestock, sheep, while in the Deeseh project, there are three types, which are camels, cows, and sheep (Altahir, 2008; Daw, 2010). From the previous discussion, the researcher noticed that the organizational structure has the same main departments, which are plantation and livestock; in addition, some have fishery. The plantation and livestock differ from firm to firm.

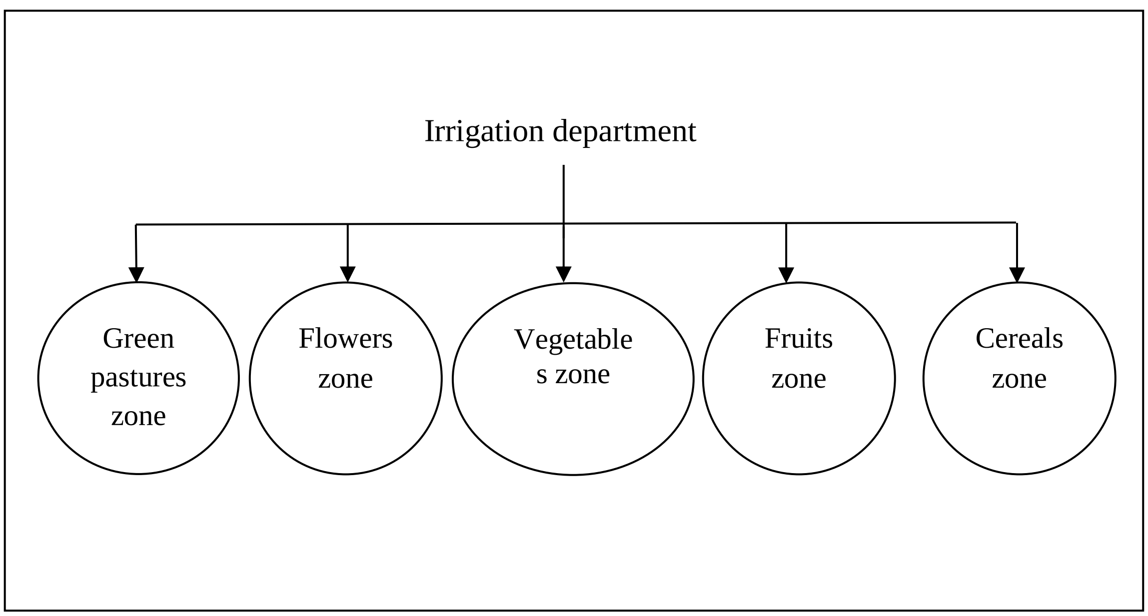

Figure 2.5
Irrigation Department in Deeseh Firm
Source: http://www.prameg.com/vb/t135327.html

2.6 Agricultural Production Processes for Plantation

The production operations in agricultural firms consist of several stages, like the production operations in manufacturing firms. Figure 2.6 shows the stages of the plantation process. The production operations include input, conversion processes, and output. However, the conversion processes in farming differ from the conversion processes in the manufacturing sector, because they rely mostly on nature.

The development of production technology in the agricultural sector has changed this situation; farmers nowadays can control nature by using plastic houses that enable them to produce any crops in any season. For instance, farmers can grow winter vegetables in summer and vice versa. Moreover, in the past, agricultural firms relied on labour to perform all the production processes; now, however, machines and equipment carry out almost all the tasks, from cultivation to packaging.

The machinery includes tractors, trucks, harvesters, pumps, ploughs, seed distribution machines, pesticide spray machines, fertilizer distribution machines, seed cleaning machines, and cleaning machines. Gandeel (1978) stated that there are two production seasons in agricultural firms: the first one lasts from September until April, while the second one lasts from June until September. The production process in Tssawa agricultural firms consists of several stages, including maintenance, tilling or cultivation, watering, fertilizing, pest control, harvesting, and preparing the grains.

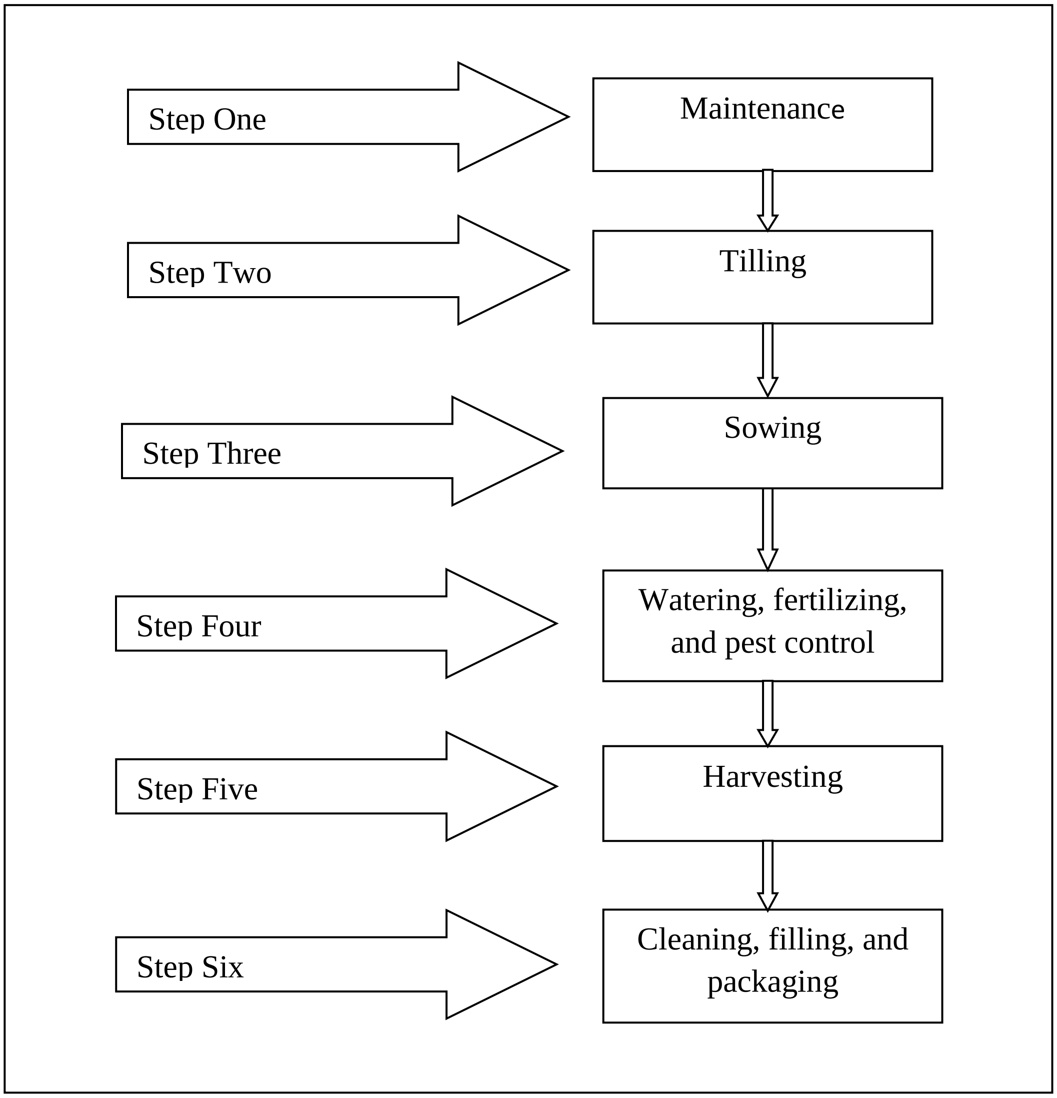

Figure 2.6
Plantation Process Stages
Source: Zaki (2004)

2.6.1 Maintenance

In the public sector, every agricultural firm has its own machines, but this is not the case for private sector firms, which rent machines. Before each production process, the maintenance department repairs the agricultural machines to be ready to start the production process. These machines include pivot irrigation machines, tractors, ploughs, sowing machines, pest control machines, and fertilization machines. They use spare parts from the stock if they have them, or they buy those parts from the markets to change expired parts, and they grease the machines. Therefore, maintenance is the first and most important step in plantation departments, because a particular type of plant grows during a specific period of time and the agricultural machines should be ready and reliable during that time. If any machine cannot accomplish its task within that time, the firm might have to forego that season's production.

For instance, Libyan agricultural firms cultivate barley and wheat on 1 September every year. If any machine is not functioning at that time, the firm will not be able to fix it in time, since Libya does not produce the spare parts locally. Firms have several solutions to this problem, including decreasing the cultivated area; in this case, the firm will let the other machines finish their work and ignore the work that should be carried out by the non-functioning machine. Moreover, the management will force the drivers of the other machines to work overtime to perform that machine's work or hire a replacement machine. However, all the previous solutions increase the cost of the production (M. Shamasa, personal communication, 26 January, 2012). Therefore, in all Libyan agricultural firms, the maintenance department must be ready to solve mechanical problems.

2.6.2 Tillage Process

The second process in plantation consists of the tilling operations. Before starting cultivation, the fields should be cleaned of the previous crop waste. This step needs special tools to remove the hay and make the soil ready for the next process; however, some agricultural firms burn the fields to make sure that all the previous plants and their seeds are destroyed. Then, the soil is watered for several days to make the tilling process easier or to enable the ploughs to enter the ground deeply to make the surface soil go down and the lower soil rise to the surface. Figure 2.7 shows the tillage process.

Figure 2.7
Tillage Process
Source: General People's Committee for Agriculture, Livestock and Marine (2009*)*

2.6.3 Sowing Process

All the previous steps are performed using different types of tractors, with sowing machines and ploughs attached. The sowing processes differ from one season to another: some plants are grown in the winter and others in the summer. For instance, barley and wheat are grown in the winter, while corn is grown in the summer. Thus, according to the season, the engineers decide which plants should be sown in the fields. Figure 2.8 depicts the sowing process.

Figure 2.8
Sowing Process
Source: http://www.at.all.biz/img/at/catalog/14414.jpeg

2.6.4 Watering, Fertilizing, and Pest Control

The third stage, after maintenance and cultivation, is the watering stage. Most Libyan agricultural firms are located in places where the soil is arable; however, these places receive less rain. Therefore, watering processes are performed using pivot irrigation machines. Pivot irrigation systems are used to water long-distance acres and rely on underground water, as shown in Figure 2.9. Agricultural firms in Libya use two types of these machines: the first one covers 50 acres while the second one covers 70 acres. Workers keep watering the crops until the crops become mature; during that period, the agronomists add specific percentages of fertilizer at specific times. According to Gandeel (1978), there are three types of fertilizers: 1) chemical fertilizers, which include nitrogen fertilizers, phosphate fertilizers, and potassium fertilizers, 2) natural fertilizers, such as animal waste (manure) or fertilizers made from field waste or animals' dried blood, and 3) green fertilizers, which result from growing some types of plants and then tilling the ground to make those plants food for new plants, such as legumes, because they are rich in nitrogen. However, sometimes agronomists notice that there are some pests among the crops, which are usually wind-blown or sometimes accompany the seeds. If the workers discover that there are pests in the fields, they spray these fields with pesticides. The workers use tractors if the target field is small; however, they use agricultural aeroplanes if the area is very large.

Figure 2.9
Pivot Irrigation System
Source: General People's Committee for Agriculture, Livestock and Marine (2009)

Some agricultural firms, like Mknusha, have a laboratory to analyse the soil to determine which kind of fertilizer should be added, for instance, the percentage of nitrogen that should be added to the soil. According to A. Alsalheen (personal communication, 3 March 2012), sometimes there is no need to add fertilizers because the soil has sufficient.

2.6.5 Harvesting

When the field becomes fully mature, the workers prepare the machines for harvesting operations, including cleaning, oiling, and greasing the machines. The process of harvesting occurs two times during the year, in March and in September. In this process, the agricultural firms use many machines, according to the type of crop that they want to harvest. Some machines are used for harvesting barley and wheat, and these machines differ from those machines used for harvesting corn or any other crops. Harvesting machines are used only twice a year; however, farms in the private sector do not own these types of machines. Only large public sector firms can own such machines because of the high cost.

The Libyan Government has allocated harvesting machines to every town in Libya to assist small farms in harvesting their fields mechanically and not manually. In every town in Libya, an agricultural association has been established to provide small farmers with the seeds, fertilizers, and machines that they need, including harvesting machines. Therefore, all the farms in the private sector rent harvesting machines from agricultural associations in their towns, while the large agricultural firms owned by the Libyan

Government have their own machines, because they can afford to buy and maintain them.

2.6.6 Cleaning, Filling, and Packaging

The final step before marketing the products is to clean the grains using a special machine. This machine separates the grain from small stones and straw, then the grain is sent to grain storage silos to be ready for the next step, which is to put the grain into bags weighing 50 kg each, while hay is pressed into square shapes to be sent to the livestock department to feed the animals or to be sold in the markets.

2.7 Agricultural Expenditure in Libya

Libya subsidizes agricultural farms with billions of Libyan dinars. During the last three decades, Libya has spent 5.5 billion Libyan dinars on the agricultural sector. Table 2.3 shows the actual expenditure from 2006 to 2009. In addition, Libya set a five-year plan from 2006 to 2010, allocating 2.3 billion Libyan dinars to support the agricultural sector, 1.2 billion dinars to support local farmers as loans, and 2.1 billion dinars to develop the agricultural infrastructure (General People's Committee for Agriculture, Livestock and Marine, 2009). According to Mohamed and Gassem (2009), the agricultural investment in Libya was 5.45% in 1990, while in 1993 it rose to 49.88%, that is, almost 50% of Libyan investment.

Table 2.3
Actual Expenditure during the Period from 2006 to 2009

Year	Actual expenditure (Libyan dinars)
2006	181,922,292
2007	313,419,445
2008	271,815,665
2009	274,370,630
2009*	101,390,415
Total	1,142,819,447

* Payment obligations of prior years
Source: General People's Committee for Agriculture, Livestock and Marine (2009)

2.8 Agricultural Gross Domestic Product (GDP) Share in Libya's Total GDP

The agricultural sector is one of the most important sectors in the Libyan economy. In 1954, the contribution of agriculture to the national income was 26% (Gandeel, 1978; Helen, 1987). This percentage declined as a result of the discovery of oil. However, due to the Libyan Government's attention to the agricultural sector, the agricultural share in the gross domestic product (GDP) is increasing, as depicted in Table 2.4. It is apparent from the table that in 1991, the agricultural share in the Libyan GDP was 4.5%; this percentage increased gradually over the years, reaching 9% of the Libyan GDP in the year 2002.

Table 2.4

Agricultural (GDP) Share in the Libyan Total GDP

Year	Agricultural GDP %
1989–1990 (average)	7.4
1991	4.5
1992	6.5
1993	6.19
1994	7.25
1995	7.23
1996	6.64
1997	6.93
1998	8.54
1999	7.89
2000	9.1
2001	9.1
2002	9

Source: Abidar and Laytimi (2005, p. 9)

2.9 Arable Land in Libya

Libya has a total area of about 1,759,540 sq km. Most of this land is desert (Gandeel, 1978). It extends from the Mediterranean Sea in the north to the Sahara in the south. It is surrounded by six countries, Tunisia, Algeria, Niger, Chad, Sudan, and Egypt, as depicted in Figure 2.10. According to the General People's Committee for Agriculture, Livestock and Marine (2009), the arable land in Libya is estimated to be 3.645 million acres, almost 2% of the Libyan land.

Figure 2.10
Location of Libya
Source: http://maps.google.com.my

Al-Masri (1997) divided the arable land in Libya into the following four areas:

- Coastal zone: This occupies the strip of land between 5 and 25 km wide along the sea. In the west, this area extends to more than 100 km. The average annual rainfall is between 200 and 2500 mm. Therefore, supplementary irrigation using underground water is used.
- Mountain zone: In Libya, there are two mountainous areas. These are the green mountainous area, located in the east of Libya, and the western mountains. These mountains lie to the south of the coastal area. The average annual rainfall in the western mountains is between 200 and 300 mm, and the soil is lighter than in the green mountains.
- Semi-desert zone: This area lies immediately south of the mountainous area and is parallel to that zone. In this region, the average annual rainfall is between 50

and 150 mm. This zone is used for grazing animals, such as goats, sheep, and camels. Recently, the Government has set up 17 agricultural projects in this area, allocating over 800,000 acres to plant fodder shrubs.

- Desert zone: This region constitutes 90% of the Libyan land (Gandeel, 1978). The zone consists of sand dunes and barren hills with almost no rainfall. However, due to the discovery of massive groundwater in some parts of the desert, the Libyan Government has established many agricultural firms.

The General People's Committee for Agriculture, Livestock and Marine (2009) stated that about 400,000 acres of this land depend on underground water, while 3,000,000 acres depend on rain to irrigate plants.

2.10 Agricultural Production in Libya

According to Purcell (2004), there are many types of agricultural products in Libya, like cereals, vegetables, fruits, and forestry. Firstly, five types of cereals are grown in Libya, namely wheat, barley, oats, millet, and maize or sweetcorn. In the 1980s, barley, wheat, and millet were the principal cereal crops in Libya. However, barley and wheat were cultivated throughout the country but millet was cultivated in the southern oasis. The optimum yield for wheat cultivation in Libya was about 5 tons per hectare (Helen, 1987). However, barley and wheat are the most important crops in Libya (Purcell, 2004). Tables 2.5 and 2.6 illustrate the most important agricultural production during the years 1995 to 2002 and 2006 to 2009.

Secondly, many types of vegetables are grown in Libya (Gandeel, 1978). These types include tomatoes, potatoes, aubergines, cucumbers, onions, garlic, carrots, radishes, turnips, and all edible leafy vegetables. However, potatoes, onions, and tomatoes are the most important types of vegetables grown in Libya (Purcell, 2004). Thirdly, the FAO mentions in one of its reports that Libyan farms grow the following types of fruits: date palms, olives, grapes, figs, apricots, plums, citrus fruits, apples, and almonds. However, according to the General People's Committee for Agriculture, Livestock and Marine (2009), Libya focuses more on date palms and olive trees because it aims to reduce desertification and to create new economic activities. In addition, Libya wants to vary its national income. Thus, Libya farmed 2,164,816 palm trees and 3,421,055 olive trees between 2006 and 2009.

Although Libya grows many types of fruit trees, olives and palms are the main types. For instance, it grows 60,000 mango trees. Finally, most of the areas that are not suitable for the cultivation of crops have been planted with forest trees, especially pine (mountain region), acacia (inland), eucalyptus, and desert shrubs, depending on the soil type and rainfall. Libya has planted more than 7 million forest trees to change its climate and fight desertification. Libya cultivates these types of agricultural products as well as planted legumes, such as peas, groundnuts, beans, broad beans, chickpeas, and buckeye peas.

Table 2.5

Most Important Farm Products during the Period from 1985 to 2002

Year	Tons			
Years	Wheat	Barley	Fruits	Vegetables
1985	149000	83000	-	-
1986	150000	142000	587334	-
1987	175000	99000	621468	-
1988	161000	119000	641977	-
1989	185000	126000	663202	-
1990	128000	141000	674029	-
1991	110000	205000	612000	921
1992	123806	198433	607881	1013
1993	72549	156000	597685	1120
1994	44363	180000	599531	1151
1995	23000	117000	599531	1183
1996	28000	124000	600000	1100
1997	27240	118650	630000	1250
1998	46670	217260	635000	1340
1999	68890	305512	641280	1500
2000	64000	264050	650000	1650
2001	48500	230000	650000	1650
2002	54260	262910	650000	1650

Source: General People's Committee for Agriculture, Livestock and Marine (2009)

Table 2.6
Most Important Farm Products during the Period 2006 to 2009

Year	Tons				
Years	Wheat	Barley	Corn	Olive oil	Dates
2006–2007	34519	15519	4000	-	-
2007–2008	34128	35630	4000	-	-
2008–2009	21555	50042	4000	60.8	1679

Source: General People's Committee for Agriculture, Livestock and Marine (2009)

According to the General People's Committee for Agriculture, Livestock and Marine (2009), agricultural production increased in Libya from 1970 to 1985. For instance, in 1970, Libya's production of wheat was 27,200 tons, but by 1985 it had risen to 210,000 tons. However, during the last few years, wheat production has decreased because of marketing problems due to low prices in the market compared with high production costs. Therefore, the production was 67,000 tons in 2005. On the other hand, barley production was 52,800 tons in 1970, whilst in 2005, it rose to 233,000 tons. In 1970, vegetable production was 120,000 tons, rising to 662,000 tons in 2005.

2.11 Cost Accounting Systems in Libyan Agricultural Firms

To make various decisions in the business environment, cost information is needed. Cost accounting systems provide appropriate cost information that assists in making the right decision or choosing the most profitable option from the available alternatives. Zaki (2004) stated that cost accounting provides useful cost information to agricultural firms related to assisting them to make comparisons between the year's expenses and the year's profits and to use these comparisons to set estimated budgets. Agricultural firms can use cost information to set products' prices and determine the cost of every product separately; in addition, cost information is used to prepare financial statements precisely.

As for manufacturing firms, the cost elements in agricultural firms consist of three elements: materials cost, labour cost, and overhead costs. Agricultural firms in Libya produce different types of products (plants and livestock); therefore, the cost elements that relate to the plant department are different from the cost elements that relate to the livestock department, especially those for materials, because the materials used to produce plants cannot be used to produce livestock. Libyan agricultural firms differentiate between the materials used to produce plants and those used to produce livestock; however, although the labour needed to produce plantations and the labour needed to produce livestock are not the same, Libyan agricultural firms combine together and the labour cost might be allocated to one department. Figure 2.11 shows the cost elements in Libyan agricultural firms.

Libyan agricultural firms prepare cost statements for every product separately at the end of every year, which include the labour cost, operation expenses, production requirements, service expenses, and depreciation. To prepare the cost statement, timely and accurate information is needed. Although activity-based costing (ABC) can provide more accurate cost information than traditional costing (Johnson & Kaplan, 1987; Majid & Sulaiman, 2008; Kachalay, 2012), Libyan agricultural firms still rely on traditional costing to determine their product costs and make managerial decisions (Aljazawe, 2006). Because many expenses are indirect expenses that are spent on all the products, such as managerial costs and maintenance costs, implementing innovative cost accounting systems is necessary to assist agricultural firms in allocating indirect costs precisely to the products that consume those costs.

ABC will provide accurate cost information that assists decision makers in making appropriate managerial decisions, for instance setting competitive prices or comparing the product costs between two or more years to determine why the product costs are different from one year to another.

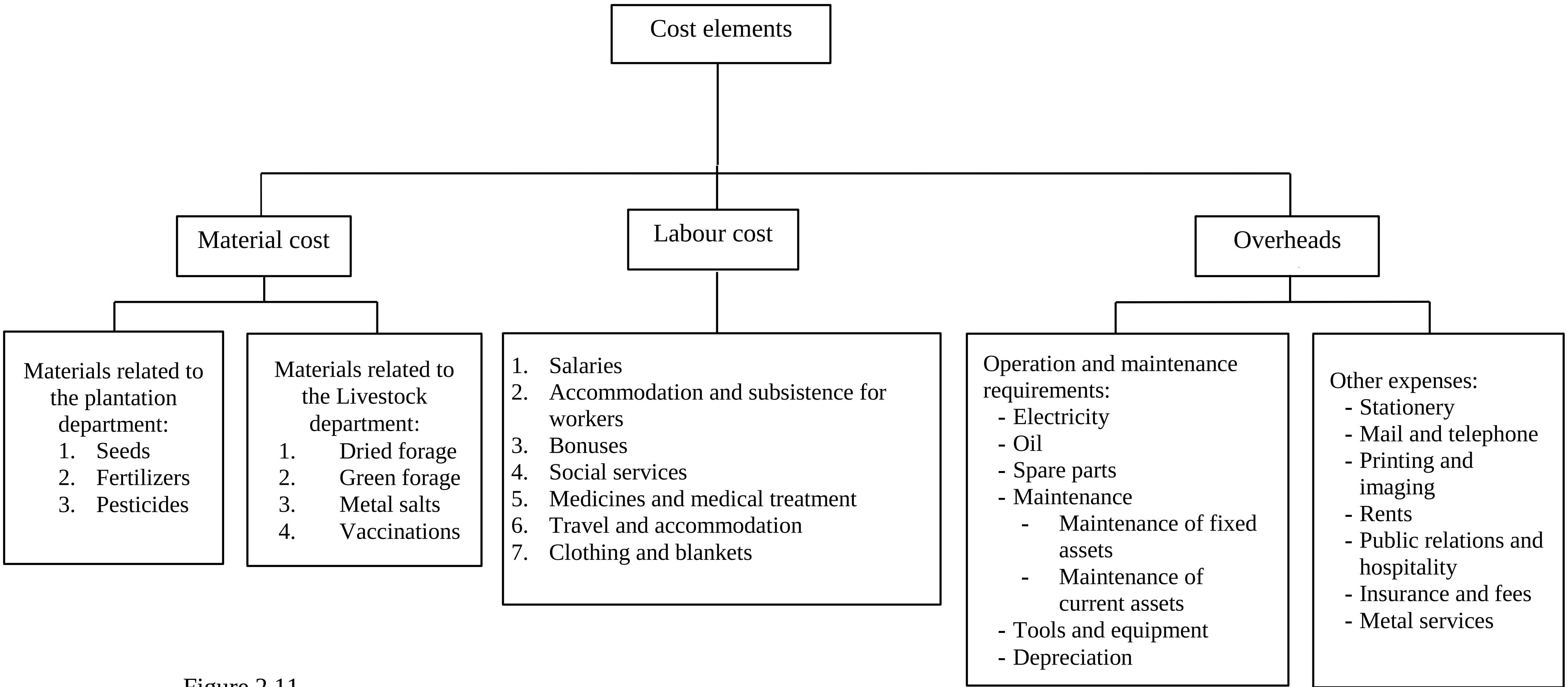

Figure 2.11
Cost Elements in Libyan Agricultural Firms
Source: Mknusa agricultural firm

2.12 Summary

Although the Libyan economy has relied heavily on agricultural activities since Grecian times, the Government, in the middle of the last century, switched its attention to the oil sector, because the oil sector earns more money in less time. However, in the later part of the last century, Libya faced economic sanctions, which caused the Libyan Government many difficulties in importing agricultural products. The Government planned to achieve food self-sufficiency. From that time, Libya began to spend more money on rebuilding its agricultural firms. Libya planted millions of forest trees to combat desertification (General People's Committee for Agriculture, Livestock and Marine 2009). With regard to their organizational structure, most Libyan agricultural firms have two main departments: the production department, which is divided into two branches, plantation and livestock, and the administrative department. Currently, all firms have nearly the same departments. However, the differences start after this point, because the plantation department is divided into many branches, according to how many types of plants or trees the firms plant. The types of livestock are different too. Most of the Libyan agricultural firms produce cereals, especially barley, corn, and wheat. However, the planting of palm, orange, and olives trees is gaining much attention from the Libyan Government. Accurate cost information is required to assist decision makers in making appropriate managerial decisions.

CHAPTER THREE
LITERATURE REVIEW

3.1 Introduction

In this chapter, the researcher reviews the literature related to cost accounting systems. Chapter Three is divided into two sections. The first section contains an overview of cost accounting systems and includes the concepts related to the definition of cost accounting systems, elements of costs, classification of costs, history of cost accounting systems, and significance of cost accounting. The second section includes a review of the literature related to cost accounting systems in the manufacturing sector, cost accounting systems in the service sector, and cost accounting systems in the agricultural sector and finally presents the conclusion.

Definitions of the Key Terms Used

Table 3.1
Definitions of the Key Terms Used

Concepts	Author's definitions
Cost accounting systems	A group of techniques and methods that include costing methods, such as full costing and direct costing, overhead allocation bases, such as activity-based costing, and depreciation methods, such as straight line. These methods are used to assist decision makers in making many decisions, for instance setting selling prices, cost control, determining product costs, and preparing financial statements.
Cost object	The cost object is the final product that is loaded by all the production costs (direct and indirect costs), such as quintals of grain in barley production, kilograms of fruit production, heads of animals in livestock production, or the acre.

Table 3.1 (Continued)

Concepts	Author's definitions
Overhead costs	These include all the indirect costs that are incurred in all the departments, including the operational, administrative, and service departments, which are necessary to produce and deliver the products, as well as the expenses incurred in general management and service centres.
Traditional costing	This is an old cost accounting system that is used to allocate overheads to products, using one stage relying on direct machine hours or direct labour.
Activity-based costing	This costing system focuses on the activities and allocates overheads using two stages, from the resources to activities then from the activities to cost objects.

3.2 Overview of Cost Accounting Systems

3.2.1 Concept and Definition of Cost Accounting Systems

Cost accounting systems (CASs) are managerial tools that aim to achieve certain objectives, such as providing cost information for decision making, cost control, and determining product costs. CASs can produce information necessary for decision makers, assist in the preparation of financial reports, and help the senior management in any business organization to carry out its functions (Juchau, 1986; Nor & Abdulmagsood, 1989; Chenhall & Langfield-Smith, 1998b; Wijewardena & Zoysa, 1999; Obara & Ukpai, 2001; Haldma & Lääts, 2002; Szychta, 2002).

In relation to the definition of CASs, some researchers, for instance Nor and Abdulmagsood (1989), have argued that although there are many definitions of CASs, most refer to the same meaning. The Institute of Cost and Works Accountants (ICWA) (as cited in Gupta, Sharma, & Ahuja, 2006, p. 6) defined CASs as:

> The process of accounting for cost from the point at which expenditure is incurred to the establishment of its ultimate relationship with cost centers and cost units. In its widest usage, it embraces the preparation of statistical data, the application of cost control methods and the ascertainment of the profitability of activities carried out or planned.

The definition of cost accounting according to the ICWA includes the concept and the role of cost accounting (Amara, Kalefa, & Alsaheeri, 1992). Owler and Brown (1965) claimed that the ICWA defined the term “cost accountancy” as: “the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decision making” (p. 1). Costing refers to the techniques and processes of ascertaining costs. In other words, costing refers to the classifying, recording, and appropriate allocation of overhead costs to determine the costs of products or services. Therefore, CASs can be summarized as encompassing the above claims made by the authors mentioned.

CASs are managerial tools that help managers to make strategic and operational decisions (Pavlatos & Paggios, 2009). Ning (2005) noticed that these tools are widely used in the industrial sector. Researchers have been studying cost accounting techniques in industrial firms for decades. According to a few researchers, cost accounting was developed during the Industrial Revolution sometime in the middle of the eighteenth century (Fleischman & Parker, 1991). CASs, especially those in the industrial sector, have received much attention from accounting researchers. As mentioned in the previous paragraphs, CASs provide cost information for internal or managerial use and external use to prepare financial statements (Talha, 2010). In this thesis, the researcher focuses on cost information for managerial use in agricultural firms, which has been almost neglected in the accounting literature (Juchau, 2000).

3.2.1.1 Elements of Costs

According to the cost accounting literature, to facilitate the determination of product costs, the total costs are sub-divided into three elements, namely material costs, labour costs, and expenses (Blocker & Weltmer, 1954; Horngren, Datar, & Foster, 2006). Material costs are the substances used to make the product; materials could be in a raw or a manufactured state and could be used directly or indirectly in production (Narsis, 2009). There are two types of materials used in production, namely: 1) direct materials that include the substances that become a part of a certain product and could be easily identified with that product; in other words, materials costs can be charged directly as part of prime costs (e.g., wood in furniture making, iron in automobile production, rubber in tyre production, or fabric in cloth production); and 2) indirect materials, referring to all the materials that cannot be traced directly to a specific product, or even if it is possible to trace those materials to the product, they have relatively insignificant costs (e.g., nails, glue, grease, and oil). Narsis (2009) defined indirect costs as “materials which cannot be allocated but which can be apportioned to or be absorbed by cost centers or cost units” (p. 20). Prickett (1944) and Horngren et al. (2006) argued that material costs include not only the material prices, but also the cost of material purchasing, handling, and storing; actually, all the costs related to buying, transporting, and storing the materials should be added to the material costs.

Labour costs refer to the conversion of the materials into finished products. This process needs human work and is called labour costs. In other words, labour costs include all the labour expended on altering the construction, conformation, or condition of the product, including skilled and unskilled workers' wages. Labour costs are also classified into direct labour costs and indirect labour costs. Direct labour was defined by Noltemeyer (1986) as "labor which may be consistently identified with the product by unit, part number, operation, or department, or by whatever unit of cost is employed in the cost system" (p. 45). Direct labour includes the work of employees whose job is important and directly involved in producing the product (VanDerbeck, 2010). For instance, the job of the employees who work on an assembly line in automobile production is considered direct labour for producing the cars, and the salaries of those employees are known as direct labour costs. Indirect labour refers to all the employees whose work is not necessary to change the raw materials into the finished commodity, such as foremen or security guards; although these employees' jobs are important to finishing the product, they are not directly related to the product (Owler & Brown, 1965; Blocker, Stout, Juras, & Cokins, 2013).

The third element of costs, called expenses, is also divided into direct expenses and indirect expenses. Direct expenses refer to those expenses that are easily allocated to cost centres or cost units, such as the cost of special tools for a certain product or hiring special machines required to accomplish a specific job (Blocker & Weltmer, 1954; Horngren, Datar, Foster, Raja, & Ittner, 2009). Indirect expenses are the opposite of direct expenses and refer to the expenses that cannot be allocated to cost centres or cost units (Narsis, 2009). Some scholars, such as Blocher et al. (2013), have referred to indirect expenses as overhead costs, which are defined as the cost of indirect material, indirect labour, and other expenses that cannot be charged directly to specific cost units or cost centres.

The nature of agricultural firms is different from that of other firms, such as manufacturing firms; thus, the nature of raw materials, labour, and expenses in agricultural firms is different from that in other firms. For instance, raw materials in agricultural firms could be seeds, fertilizers, water, etc.; these types of materials cannot be used in manufacturing or servicing firms. Even in agricultural firms, the cost elements differ between firms that produce vegetables and firms that produce livestock. Therefore, the results of studies that focused on explaining the cost elements in manufacturing firms cannot be generalized to firms in other sectors, as every sector has its own characteristics that differ from those of other sectors. Thus, more studies are needed to understand the use of cost accounting systems in agricultural firms.

3.2.1.2 Classification of Costs

Costs can take several classifications: for instance, costs can be classified according to identifiably, including: 1) direct costs, that is, costs that can be easily traced to the cost object, which include direct labour and direct materials (Horngren et al., 2009), and 2) indirect costs that cannot be traced easily to the cost object because there is no clear relationship between the cost and the cost object; therefore, in such cases, the cost accountants use allocation bases to allocate the indirect cost to the products, including traditional costing (e.g., machine hours, direct hours) or ABC (Horngren et al., 2009).

Another classification of cost is made according to behaviour, including the following. 1) Fixed costs, namely costs that remain constant. In total, regardless of changes in the level of activity, fixed costs are not affected by changes in activity. Consequently, as the activity level rises and falls, the fixed costs stay constant in the total amount. Fixed costs can create confusion if they are expressed on a per unit basis. This is because the average fixed costs per unit increase and decrease inversely with changes in activity. For instance, if the company produces 1000 units and its fixed cost is MYR 10,000.00, the fixed cost per unit will be MYR 10.00, but if the firm increases its production to 2000 units, the fixed cost per unit will be MYR 5.00. 2) Variable costs, which refer to costs that vary in total, in direct proportion to changes in the level of activity. The activity can be expressed in many ways; however, direct material is a good example of variable costs (Owler & Brown, 1965).

Costs can also be classified according to functions, including production costs, which occur during the conversion of materials into finished products, administration costs, which refer to the costs of determining firms' policies, leading the organization, and controlling the operations, selling costs, which mean all the costs incurred in facilitating sales, and, finally, distribution costs, which include all the costs that occur as a result of the distribution of products (Blocker & Weltmer, 1954). Controllability costs are classified into two types, namely controllable costs, which refer to costs that occur in a specific responsibility centre – in other words, all the costs that can be controlled by the executive head of the responsibility centre are considered controllable costs – versus all the costs that occur in the firm and then are allocated to responsibility centres, which are considered uncontrollable costs, because responsibility centres cannot control these costs (Blocker & Weltmer, 1954).

Furthermore, costs can be classified according to their relationship with production. These include: 1) prime costs, which refer to the direct material costs and direct expenses necessary to start producing the product, 2) conversion costs, which refer to processing the materials into the finished commodity and include direct labour costs and factory overheads, and 3) period costs and product costs. Period costs include all the costs that belong to goods sold accounts, whereas costs included in inventory values are known as product costs. However, when the inventory is sold, the product costs become period costs (Dutta, 2004). Other costs are classified according to normality, including normal costs and abnormal costs. When the cost falls within the target fixed in the budget, this type of cost is considered as a normal cost; however, if the cost exceeds the budget, it becomes an abnormal cost (Dutta, 2004; Narsis, 2009). The researcher expected that Libyan agricultural firms classified their costs to facilitate managerial decisions and to determine the product cost appropriately.

3.2.2 History of Cost Accounting Systems

The development of CASs can be divided into three stages. Prior to the Industrial Revolution, the production processes were very simple and the prices for the production materials, including raw materials, intermediate outputs, and final products, were procured from the markets (Edwards & Newell, 1991; Ning, 2005). Three types of firms existed prior to the Industrial Revolution, namely family firms, referring to all the family members working together to produce their own products (e.g., the whole family works on the farm to produce agricultural products for their own consumption), handicraft firms, referring to the production of commodities relying on skills and domestic systems by buying the raw materials from the markets and then sending them to artisans to make the product parts, and finally entrepreneurial firms, involving collecting those parts to make the final products (Ning, 2005).

Since the markets provided the prices for all the production requirements at that time, producers did not need CASs, because the owners could simply determine the product costs and set the prices (Garner, 1947). Edwards and Newell (1991) argued that Solomons claimed that from the fourteenth century until 1875, the most important thing that cost accounting provided to the business environment was the advent of records of industrial processes using the double-entry framework and the tracing of internal transfer of products from one operation to another. Cost accounting before 1875 was at a very preliminary stage; because of a lack of competition, firms could determine their product costs as most firms produced only one product. Besides, firms could set any price they wanted for their goods. However, these circumstances no longer existed during the Industrial Revolution (Edwards & Newell, 1991).

Johnson and Kaplan (1987) argued that the industrial revolutions of the eighteenth and nineteenth centuries were the starting point for the emergence of CASs. Previts and Merino (1998) (as cited in Hume-Schwarz, 2007) supported Johnson and Kaplan's statement, stating that CASs were used after 1800 and used widely after the Industrial Revolution. Edwards and Newell (1991) argued that after 1875, cost accounting provided greater information for managerial decision making. However, because firms considered their CAS to be a top secret, writing related to CASs was rare (Hume-Schwarz, 2007). Ning (2005) argued that the development of manufacturing processes made the production operations more complex than ever before. The first Industrial Revolution, which occurred in the eighteenth century, introduced new production systems that relied on producing commodities in one place by gathering the artisans under one roof, to decrease the transportation costs and to meet the market demand for more products.

New production systems, such as textile mills, established in the first half of the nineteenth century, changed the production processes from simple operations to complex processes, increased the capital, and produced mass products, causing decision makers to request more information to manage those operations, as well as increasing the demand for cost control (Edwards & Newell, 1991; Ning, 2005). Factories started controlling their costs in terms of assessing the material flow and production efficiency (Johnson & Kaplan, 1987). The demand for control was the reason for the emergence of CASs. The Industrial Revolution changed the production processes from labour-intensive to machine-intensive, which in turn led to changes in the cost structure in terms of increasing the manufacturing overhead costs as a result of mass production. Therefore, mechanical engineers suggested that overhead costs should be allocated to products (Ning, 2005).

After the Industrial Revolution, many firms integrated, which led to several changes in business organizations, including external markets not being able to offer the prices for intermediate output because firms started to produce intermediate products internally, increased the percentage of manufacturing overhead costs, and desired to decrease the conversion costs. All these actions made the determination of product costs very difficult (Ning, 2005). Making intermediate outputs internally required accountants to accumulate the costs for inventory valuation (Chatfield, 1971; Johnson & Kaplan, 1987).

The increased importance of overhead costs resulted in firms facing difficulties in determining the product costs and cost control. The Securities and Exchange Commission (SEC), after the stock market crash in the 1930s, forced the USA firms that needed money from capital markets to provide financial reports that could be accessed by outside users to know the quality of the firms. Therefore, the American firms had to evaluate the inventory and cost of goods sold at the total production costs to facilitate outside users' comparisons between firms.

Since the Industrial Revolution, firms in America have been practising product costing for financial reports. At the beginning of the twentieth century, some firms expanded by establishing branches in different places, which made the main firms delegate the authority to the sub-unit managers to make the decisions that would increase the organizational profits overall. Therefore, firms developed responsibility centres, whereby every manager was made responsible for his or her branch. Cost control developed to include control for costs and management, instead of controlling prime costs (Ning, 2005).

During the second decade of the twentieth century, accountants stated that CASs could be used to achieve managerial needs, instead of using cost accounting just to determine the costs of goods sold and goods produced (Fleischman & Tyson, 1993). Other researchers, including Edwards and Newell (1991), claimed that after 1875, cost accounting information was used to assist the management in making various managerial decisions. Thus, CASs were used to improve firms' management by providing detailed cost information at the proper time; cost information was also used to determine the unit cost precisely to assist the decision makers in setting the prices, to evaluate the production lines, and to eliminate waste.

However, Edwards and Newell (1991) argued that using CASs to assist the management in decision-making processes can be traced to 1875, during the Industrial Revolution, and not the twentieth century as argued by other researchers, such as John Blocker (as cited in Hume-Schwarz, 2007). Fleischman and Tyson (1993) supported Edwards's opinion, stating that during the Industrial Revolution, CASs were used for managerial purposes. However, after the Second World War, a new term, "management accounting", emerged (Edwards & Newell, 1991). Management accounting is used to provide decision makers with statistical information for the purposes of planning, controlling, and decision making, whereas cost accounting is used mainly to identify and accumulate product costs. However, nowadays, many accounting researchers treat management accounting and cost accounting as synonymous (Edwards & Newell, 1991).

The majority of cost accounting researchers who discussed the history of cost accounting systems focused on the development of cost accounting in manufacturing firms. Only a few accounting researchers mentioned cost accounting in the agricultural sector, including Juchau (2002), who stated that Arthur Young mentioned the importance of cost accounting systems to agricultural firms in the eighteenth century. The lack of competition, the increase in the demand for agricultural products, and the fact that most agricultural firms were family firms might be the cause of the delayed use of cost accounting in the agricultural sector. However, these situations did not exist in the agricultural business environment; therefore, accounting researchers should conduct more studies on cost accounting systems in agricultural firms to identify the factors that influence agricultural firms to use cost accounting systems and to help them to use cost accounting systems appropriately.

3.2.3 Allocation of Overhead Costs

Costs can be classified into direct costs and indirect costs (Owler & Brown, 1965). Direct costs can be easily traced to final products, and indirect costs are allocated to the cost object using allocation bases. Blocher at el. (2013) defined overhead costs as those costs that cannot be traced directly to a specific product or service. As claimed by Johnson and Kaplan (1987), the introduction of the mass production system led to increased manufacturing overhead costs, which made the producers think of allocating those overhead costs to cost objects. Fleischman and Tyson (1993) argued that when the manufacturing environment was simple and overhead costs were not important, firms could manage their operations using simple techniques.

However, the increased percentage of fixed costs after the Industrial Revolution made firms allocate common costs to their products more accurately. To allocate overhead costs, firms used several overhead allocation bases. Church (1908) (as cited in Ning,

2005) claimed that in the early twentieth century, most factories used direct labour costs to allocate manufacturing overhead (MOH) costs. A direct labour base means that every product should bear MOH costs according to the total direct labour hours consumed. For example, if the product consumed 2% of the direct labour hours, the product should bear 2% of the MOH costs.

The reliance on direct labour costs was reasonable at that time because most MOH costs were caused by machine operations; therefore, the MOH costs were determined by the time spent with the machine (Ning, 2005). However, Ning (2005) stated that Church (1908) suggested another base for allocating manufacturing overhead costs in 1908, called “machine hours”.

Changing the operation processes from labour-intensive to machine-intensive led to increased MOH costs (machine set-up, depreciation value, machine maintenance), which made the use of direct labour bases for allocating overhead costs unreasonable, while using “machine hours” became more appropriate. Moreover, opening several branches in different places made allocation processes occur in two stages: 1) allocating share costs to sub-units and then allocating overhead costs from sub-units to cost objects; and 2) some firms used two bases for allocating MOH costs, namely direct labour hours and machine hours.

The waning correlation between the cost object and the indirect costs led to the distortion of the product cost, if the firms used volume-based costing to allocate MOH costs (Cooper & Kaplan, 1988). This is because traditional costing distributes MOH to all products regardless of whether the products are customized or standard, whereas in some cases, customized products yield high overhead costs (Cooper & Kaplan, 1988). It is argued that traditional costing does not serve the management needs but serves financial accounting requirements more (Brierley, 2011; Kachalay, 2012). Therefore, ABC developed to allocate overhead costs more accurately because ABC uses activities to allocate overhead costs (Johnson & Kaplan, 1987). It is argued that ABC was used in many companies in the first half of the twentieth century; however, it is now used widely and has started to receive a great deal of attention from accounting researchers and practitioners since the 1980s. Although the adoption rate of ABC is considered low, especially in developing countries, most accounting researchers have argued that ABC provides more accurate cost information than traditional CAS (Majid & Sulaiman, 2008; Kachalay, 2012). Lee and Kao (2000) suggested that the ABC system provides more appropriate cost information than traditional costing does in the fishing market, in terms of assisting decision makers to make suitable pricing decisions.

3.2.4 Significance of Cost Accounting Systems

CASs play an important role in organizations. This role differs among firms. As argued by Juchau (1986) and Hume-Schwarz (2007), CASs control the use of scarce resources to ensure that the best returns are received from those resources. As stated by Porter and Yergin (2006), water and arable land are scarce resources in Libya; therefore, implementing CASs in an appropriate way could maintain Libya’s scarce resources and direct them to proper use. In relation to health care organizations, Janet and Gus (1996) argued that CASs are tools that help firms in the health care environment by providing detailed and reliable cost information to assist them in surviving in the competitive environment. It is claimed that firms in all industries need cost information, not only health care companies or manufacturing firms. On the other hand, Juchau (1986) posited that for large, multi-product agricultural firms, the need for management accounting systems for decision making is obvious. It is argued that firms can benefit from CAS data in several ways, such as decision making, cost management, product pricing, performance evaluation, budgeting and budgetary control, and the preparation of financial statements (Wijewardena & Zoysa, 1999; Argilés & Slof, 2003; Manalo, 2005; Hannan, 2008).

Dekkera and Smidt (2003) confirmed that if firms that work in an uncertain environment and under intense competition want to survive, they have to apply target costing, which is a cost accounting technique. This method aims to reduce costs by reducing the product cost during the design stage, and this is what firms need under certain circumstances. CASs provide decision makers with accurate and reliable information appropriate for the decision-making process. According to Majid and Sulaiman (2008), firms need more accurate overhead allocation in the competitive environment of today and this can be achieved by implementing ABC. In relation to the agricultural sector, Argilés and Slof (2001) claimed that practising cost accounting in agricultural firms can improve farm management, leading to better farm performance, while farm costing is also useful for monitoring the plantation expenditures, which increase as farming becomes more modernized.

In brief, Prickett (1944) and Kaplan and Cooper (1998) argued that CASs achieve three primary goals: 1) the measurement of the cost of goods sold and the valuation of inventory for financial reporting, 2) the provision of economic feedback about process efficiency to operators and managers, and 3) the determination of the cost of activities, services, products, and customers.

3.2.5 Cost Accounting Systems

From the accounting literature, it is apparent that several CASs are implemented in the business environment for different purposes. Accountants rely on traditional costing and ABC to allocate overhead costs (Baykasoglu & Kaplanoglu, 2008). Traditional costing is used when the direct costs are high and the indirect costs are low. The overhead costs consist of MOH and administrative overheads (Blocker & Weltmer, 1954). Depreciation, the installation and maintenance of machinery, and other infrastructure required to produce the products are MOH costs, whereas managerial expenses and sales are administrative overhead costs (Deakin & Maher, 1984). The costs of direction, supervision, and training of workers can be included in the overheads as well. The costs related to work facilities, such as cafeterias, wash rooms, and first aid facilities, are also part of the overhead costs. However, the changing business environment, such as markets changing from monopolistic to competitive markets, the development of production technology, and the changes in customers' needs (Fei & Isa, 2010), have forced firms to change their production strategy to produce many types of products in different styles, shapes, and colours, whilst factory automation has made firms use the same machine to produce different types of products, leading to a larger increase in overhead costs than ever (Ning, 2005).

Johnson and Kaplan (1987) claimed that with the new production technology, traditional costing systems distort the product costs because traditional costing systems assume that to allocate overhead costs to the products produced in the same department, firms should use one of the traditional costing techniques, such as direct labour hours or direct materials. This assumption cannot be adapted to the new production systems and is not sufficient for modern manufacturing technologies, especially when the percentage of overhead costs is so high (Kachalay, 2012). Moreover, different products may use common overhead resources but not in proportion to the direct labour time or any other direct resources used; therefore, there is a possibility that the actual cost of production of each product type may be more or less than the cost calculated by using the traditional costing system (Johnson & Kaplan, 1987; Cooper & Kaplan, 1988). A new CAS in 1980, called ABC, was developed by Robert Kaplan and Robin Cooper (Geense, 2005). ABC was developed to overcome the criticisms of traditional costing systems, such as the distortion of product costs.

Although some CASs achieve the same goals in different ways, others are used to achieve specific goals. Job order costing is a cost accumulation method used for special jobs or contracts (Edwards & Newell, 1991). The costs in this system are gathered from the client's orders, and every order is separate from the others. Noltemeyer (1986) argued that job order costing is the most broadly used costing system in the wood conversion industry, because job order costing is a simple system compared with other costing systems; in the job order costing system, cost elements (labour costs, material costs, overhead costs) are gathered for every job produced. Then, the costs are recorded in the cost ledger. The labour costs include details collected based on daily labour reports written by the supervisors. Then, the labour costs are sent on a daily or monthly basis to the cost department.

On the other hand, materials are allocated to every job cost sheet according to the amount of materials consumed by the job order. Overhead costs are allocated to every job order as a percentage of the direct labour at the end of the month. The total of every job order cost account is transferred from work-in-process to finished goods when the job order is completed, and then the job cost is transferred from finished goods to cost of goods sold after selling the product. The job order costing system is used in government contracts, construction projects, shipbuilding, office machines, automobile repair, printing, textbooks, toys, wood furniture, and machine tools. In addition, job order costing accumulates the cost of professional services, for instance lawyers' or doctors' services.

Another CAS is called process costing, and it accumulates costs by operations, departments, and processes (Deakin & Maher, 1984). The process costing system accumulates the overall costs of the department, including labour costs, material costs, and overhead costs, and the next step is to spread the total process costs over the number of units produced during a specific period of time to determine the cost of every product. Process costing is used to determine the product costs in firms that produce homogeneous products on a continuous basis, such as appliances, tyres, paint, coal, textiles, lumber, plastics, rubber, cigarettes, shoes, typewriters, cement, gasoline, steel, glass, and automobiles (Deakin & Maher, 1984; Edwards & Newell, 1991).

Dekkera and Smidt (2003) mentioned one costing system, namely target costing (TC). They defined TC as “a costing technique that uses the following formula (maximum allowable cost price = attainable selling price - required profit margin) to calculate an allowable cost price to be achieved during the product development process” (p. 295). This system aims to reduce the costs during the planning and designing stages and is used in assembly-oriented industries, such as electronics manufacturing, automobiles, precision machine manufacturing, and machine tooling (Sakurai, 1989). Guilding, Cravens, and Tayles (2000) argued that TC means the process whereby a product is designed to satisfy customer needs with a target cost for the product.

TC is an essential tool for cost management in a competitive environment (Manoj, 2009). It consists of three stages: 1) determining the target price, target cost, and target profit, 2) designing the product or the components to meet the target cost, and 3) designing the components to meet the functions of TC supplier management. These three stages are illustrated in Figure 3.1.

In some cases, when one CAS is not enough, multiple costing is required. Multiple costing is used in industries in which a number of components are manufactured separately and later assembled into a final product, such as the automobile industry. In this industry, each component differs from the others in terms of the price of the materials used and the manufacturing process. To determine the product costs, process costing is used for direct materials and job order costing for conversion costs.

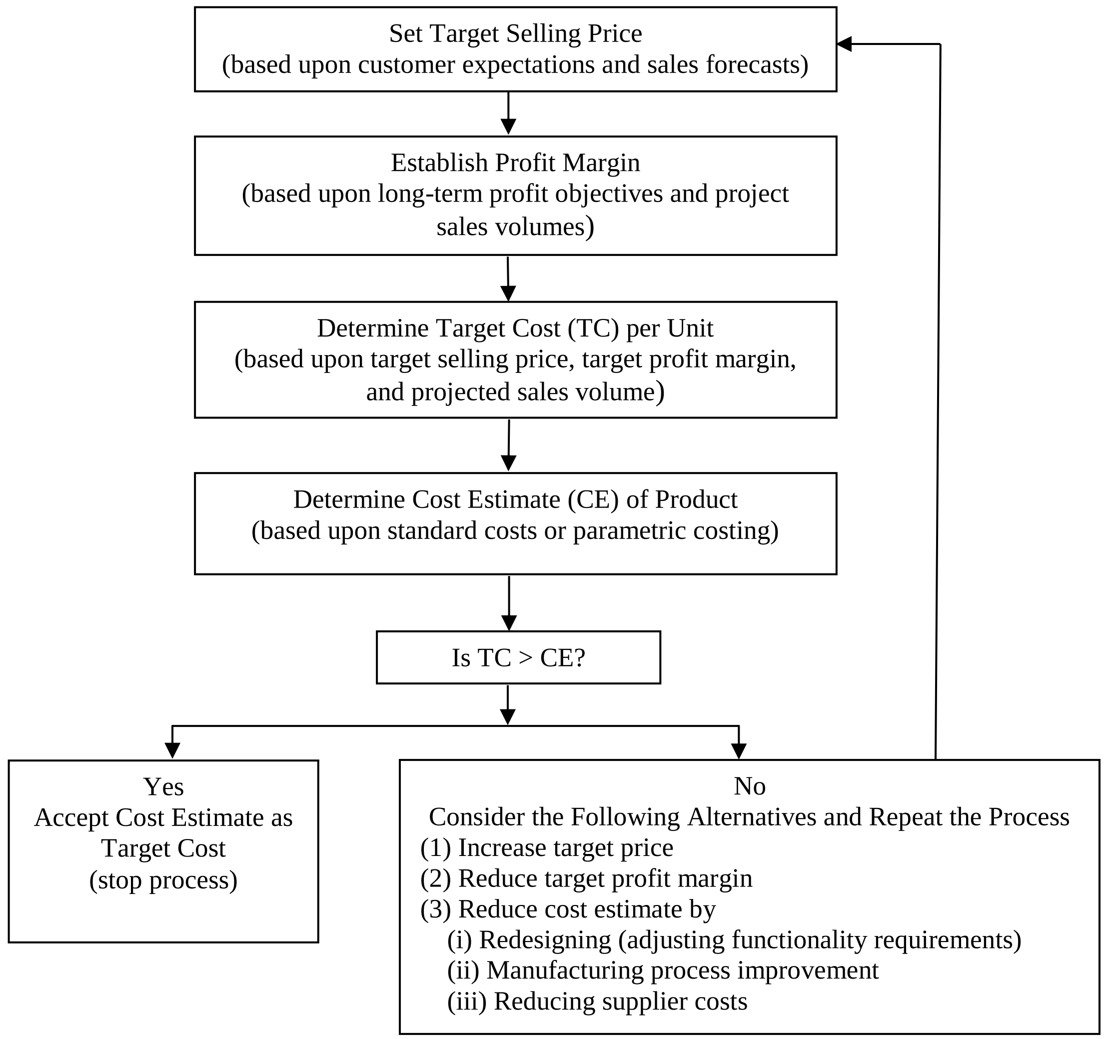

Figure 3.1
Target Costing Design Stages
Source: Manoj (2009, p. 8)

In backflush costing, firms practise advanced manufacturing techniques, such as just-in-time (JIT), when both raw materials and work-in-process are combined in one account called raw and in-process inventory, and labour costs and factory overheads are combined in one account called conversion costs (Dalci & Tanis, 2006). The inventory costs are determined upon completion of the production cycle. When the goods are finished, the direct material costs are moved from the raw and in-process inventory account to the cost of goods sold account rather than the finished-goods inventory account. This system is called backflush (BCKFL) costing, as shown in Figure 3.2 below (Fullerton & Mcwatters, 2004). This system is more appropriate for firms that operate the JIT system (Dalci & Tanis, 2003).

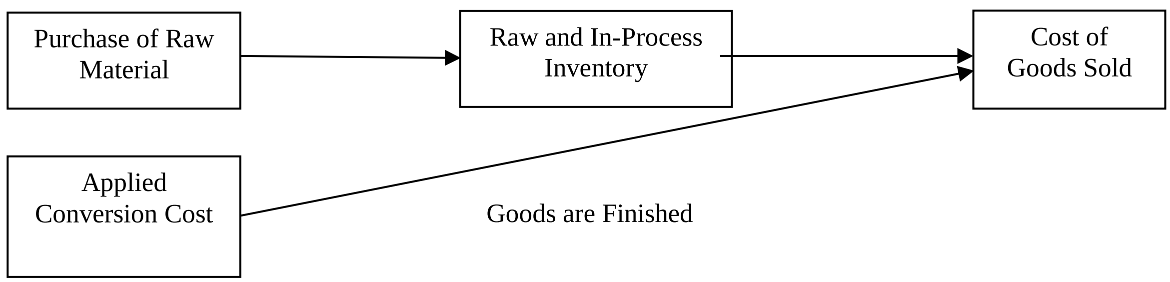

Figure 3.2
Backflush Costing System
Source: Dalci and Tanis (2003, p. 47)

Although Fullerton and Mcwatters (2004) claimed that standard costing is traditional costing, which has many disadvantages, such as the incorporation of waste and downtime, this system is still widely used. According to Ning (2005), standard costing was developed by an industrial engineer, Emerson, in 1908, and was then translated to accounting in 1911 by Harrison. Drury (1999) argued that standard costing might be a good tool if it is used appropriately to monitor trends for continuous improvement. Usually, variance analysis is used with standard costing. This method determines the deviation between standard costs and actual costs to be avoided in the future. However, this system only determines the variances after their occurrence, and therefore its information is not relevant. Johnson and Kaplan (1987) argued that variance analysis and budgetary performance measures may be appropriate for firms that emphasize low-price strategies.

Noltemeyer (1986) claimed that there are three steps to develop standard costing systems in industry: 1) carefully selecting a grade and type of material to obtain the appropriate utilization, 2) conducting an engineering study related to the firms' equipment and facilities to improve the current manufacturing methods, and 3) conducting time studies of factory operations.

Another CAS, called life cycle costing (LCC), was developed to trace the product costs from a product's inception to its abandonment. Jekayinfa, Adebiyi, Waheed, and Owolabi (2005) argued that LCC's components consist of initial costs, maintenance, repair costs, environmental costs, down-time costs, and decommissioning and disposal costs. The LCC of any tool is the total lifetime cost combining the purchase costs, installation costs, operation costs, maintenance costs, and disposal costs of the equipment (Jekayinfa et al., 2005).

ABC, which was introduced during the 1980s in the studies by Johnson and Kaplan (1987) and Cooper and Kaplan (1988), are considered to be one of the new costing systems. Schoute (2009) claimed that ABC is the most recent cost system developed to allocate indirect costs. This method focuses on activities and understanding indirect costs' behaviour (Carli & Canavari, 2013). On the other hand, it also determines the causes of the overhead costs incurred for the product or the generated cost. Accounting researchers call the generator of the cost the "cost driver". ABC collects the costs of functional activity cost pools and then allocates them according to products using individual ABC drivers (Schoute, 2009). Chenhall and Langfield-Smith (1998a) claimed that ABC provides information that might be useful in controlling the existing business processes better than competitors; if this is not possible, it helps managers to choose new ways of achieving a cost advantage. ABC can enhance the cost-effectiveness of firms and assist the management in choosing appropriate strategic decisions related to process improvement, product mix, sourcing, pricing, and the evaluation of business process performance (Fei & Isa, 2010).

According to Tsai and Kuo (2004), cost objects, such as the product, product line, process, etc., create the need for activities, which in turn create the need for resources. Therefore, the allocation of indirect costs in the ABC system has two stages, as shown in Figure 3.3. In the first stage, the resources are distributed to various activities using resource drivers. Tsai and Kuo (2004) argued that the resource drivers are factors selected to approximate the resources consumed by various activities. Each type of resource can be traced to an activity that becomes a cost element of an activity cost pool. In the second stage, each activity cost pool is distributed to cost objects using an adequate activity driver that measures the activity consumption by cost objects.

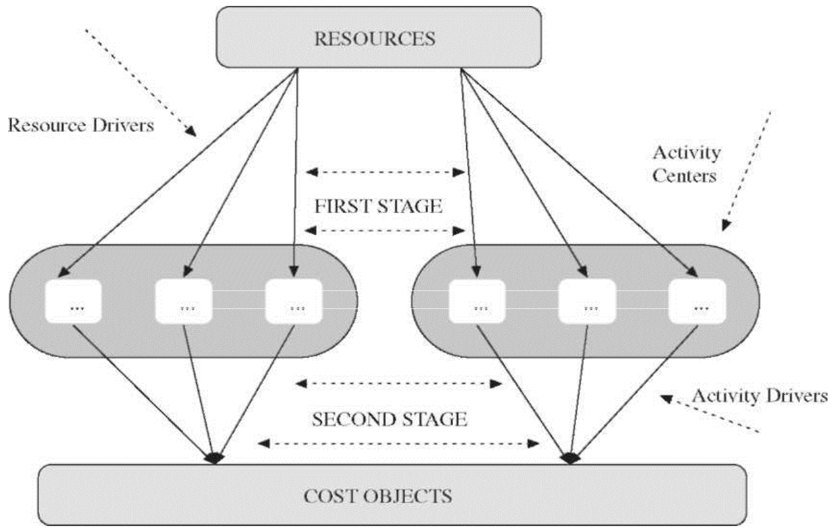

Figure 3.3
Activity-Based Costing Allocation Stages
Source: Tsai and Kuo (2004, p. 272)

Lee and Kao (2000) studied the implementation of ABC in the agricultural sector. They applied ABC and simulation techniques to analyse the operational costs of the Pu-Shin wholesale fish market in Taiwan. Lee and Kao (2000) claimed that using the ABC model can determine the product costs, that is, kilograms of fish, more accurately than traditional costing. As a result, the product price becomes competitive. They also mentioned that the ABC model uses simulation, which can certainly be applied to the agricultural sector in other countries. Therefore, implementing ABC in Libyan agricultural firms will improve managerial decisions related to pricing, sourcing, product mix, and process improvement. This system is important to all firms, as it provides them with accurate information to make short- and long-term decisions (Swenson, 1995).

Carenys and Sales (2008) discussed two CASs, namely partial and full CASs. Partial CASs are considered to be one of the traditional forms of CAS. Carenys and Sales (2008) claimed that a partial CAS allocates only direct costs to the products, whereas the indirect costs and overhead costs are allocated to cost centres. Partial cost accounting is widely used in the banking sector because of the number of common and joint costs between several cost objectives. Full CASs trace all the direct costs to cost objects, as well as all or part of the indirect costs (Carenys & Sales, 2008).

3.3 Review of the Literature Related to Cost Accounting Systems

3.3.1 Cost Accounting Systems in the Manufacturing Sector

CASs in the industrial sector have attracted much attention from accounting researchers (Karmarkar et al., 1989; Odysseas & Ioannis, 2007). Ning (2005) linked the development of CASs to the development of the industrial sector, pointing out that three causes led to the development of CASs in the USA: 1) the changes in the product markets, including changes in customers' demand and competition intensity, 2) the changes in production technology, including characteristics such as mass or batch production, the company's reliance on labour-intensive or capital-intensive products, and the structure of the production, and 3) the demand for control. American companies have faced many changes in product markets; in the beginning, these companies were working in product markets without competition because the world demand was greater than the available capacity. In such a market, companies could sell their products, regardless of the quality, at any price they wanted. This was the situation before 1960. In 1970, despite the weakening of the US dollar, US companies were protected from foreign competition by the reduction in the cost of US products (Ning, 2005). US products were made to cost less than the same products from foreign companies. After 1980, with the inflation dropping to zero and the US dollar becoming stronger than other currencies, US products became more expensive, especially in terms of foreign currencies, such as the Japanese yen (Ning, 2005). In such a situation, foreign companies were able to compete with companies in the USA markets. This forced American companies to change their policies and produce customized products instead of standardized products (Ning, 2005). All these changes, in competition intensity and customer demands, gave rise to companies demanding accurate product costing systems to achieve cost control and cost reduction.

Regarding the second change in production technology, when there was a change from standardized products to customized products, companies had to change their production technology. Factory automation (FA) was developed to meet this need. This system was first used in Japan before being used in the USA. FA enabled a company to produce one product today and another tomorrow with the ability to change the production modes rapidly. This system enabled the development of flexible manufacturing systems (FMS). The production of different types of products led to heterogeneous cost objects in manufacturing and overhead consumption. The change in production technology enabled the changeover in 1920 from being over-dependent on direct labour to being dependent on machines. This affected the cost structure in the companies and forced firms to change their allocation methods from direct labour hours to machine hours and finally to ABC.

In 1980, the third change took place, which was cost control, involving the change from direct labour to MOH. The MOH thus became more significant and complex. If a company wanted to reduce its costs, it had to concentrate on the MOH. Firms changed from producing standardized products to producing customized products using FA. This meant that one machine was used to produce different types of products. In such a situation, there was a need to control the MOH. Ning (2005) studied the factors that influenced the development of CASs in the USA's industrial sector. He ignored other countries as the situation in the USA sometimes differed from that in other countries. He also omitted industries such as service industries and the agricultural sector. As mentioned by the contingency theory, firms choose CASs according to the business environment; for firms that produce one product, it is better to use a simple CAS, whereas firms that produce different types of products are more likely to adopt more sophisticated CASs (Haldma & Lääts, 2002).

The study conducted by Roztocki and Schaltz (2003) pointed out many advantages that ABC can provide to manufacturing firms and these include reducing costs, determining a more profitable product mix, and identifying opportunities for improvement. Roztocki and Schaltz (2003) conducted their study to investigate the relationship between the implementation of ABC and three factors, namely the type of industry, size, and location. They based their results on a web-based survey in industrial and service firms in many countries, including Asia, the USA, Canada, Latin America, and Europe. Although agricultural firms are important, Roztocki and Schaltz (2003) did not include agricultural firms in their study.

Roztocki and Schaltz (2003) also found that accountants are more familiar with ABC than managers of other functions, possibly because ABC is an accounting system so accountants know it better than other employees who have experience in other fields. Based on size, they found that in firms with more than a hundred employees, 70% of the accountants and 45% of the managers are familiar with ABC, compared with 36% of the accountants and 16% of the managers in firms comprising fewer than a hundred employees. However, with regard to the implementation of ABC, they found that there is no relationship between the uses of ABC and specific sectors.

This means that the ABC system can be used for all sectors, including the agricultural sector. Nowadays, agricultural firms rely on machines more than before, meaning that the overhead costs have increased as a result of setting up new machines, maintenance, and depreciation. Agricultural firms might implement ABC to allocate those costs accurately to their products. Hence, managers will be able to make better managerial decisions. The results revealed that the implementation rates are quite similar in the manufacturing and service sectors. In the study of the relationship between the implementation of ABC and firm sizes, Roztocki and Schaltz (2003) found that large firms implement ABC, whereas small companies are most likely to use traditional costing because they do not have the diverse mix of products or services that would necessitate the use of ABC. In brief, Roztocki and Schaltz (2003) pointed out that large firms (hundreds of employees and more) are more familiar with practising ABC than their small counterparts. Furthermore, large firms are more willing to implement ABC than smaller companies. According to the previous information, ABC can be implemented in agricultural firms in Libya, because they produce multiple products and most of them have more than a hundred employees. Therefore, applying the ABC method in these firms will have advantages, such as reducing costs, identifying opportunities for improvement, and determining a more profitable product mix.

Obara and Ukpai (2001), meanwhile, studied the practice of CASs in the informal sectors in Nigeria. They divided the country into three parts: the western, eastern, and northern zones. Then, Obara and Ukpai chose 150 artisans from the eastern zone. The sample included people with one of the following nine jobs: motor vehicle maintenance, welding, block moulding, tailoring, furniture making, glazing, refrigeration and air conditioning maintenance, leather bag making, and panel beating. The researchers chose 150 artisans to facilitate questionnaire administration and collection for the purpose of data analysis. According to Obara and Ukpai (2001), CASs are the quantitative information system in the organization. Obara and Ukpai also argued that CASs have two purposes: 1) to provide cost data for external reporting; and 2) to provide quantitative data for internal use to aid the management in carrying out its functions.

Furthermore, Obara and Ukpai (2001) pointed out that there is no ready-made system of cost accounting because businesses are not alike. This is indicated by the contingency theory. Pavlatos and Paggios (2009) claimed that there is no appropriate CAS suitable for all organizational circumstances. Consequently, these circumstances will determine the appropriate CAS. Obara and Ukpai (2001) also argued that the methods and techniques of CAS are the same; it is the application of those methods and techniques that is different. Their study revealed that most of the artisans do not keep explicit records of any kind because some of them are illiterate, while others do not think that their business is large enough to keep records. Even those who keep records do not keep full records related to job orders, debts owed, sales, inventory, and cash. With regard to cost accounting methods, they found that 49.3% of them applied job order costing, 21.3% applied batch costing, 10.7% applied contract costing, 10% applied process costing, and 8.7% applied service costing.

Fullerton and Mcwatters (2004) wanted to find out if there is a relationship between the adoption of sophisticated manufacturing technologies such as JIT, total quality management (TQM), and Six Sigma and the use of traditional and non-traditional CASs. They examined 11 cost accounting systems, job order costing, process costing, standard costing, variance analysis, absorption costing, ABC, balanced score card, target costing, economic value added, backflush, and LCC. To complete their study, Fullerton and Mcwatters (2004) sent a survey instrument to 182 firms located in the USA via e-mail, fax, and mail. However, only 121 respondents returned the questionnaires. After analysing the data, they found that process costing was more suitable for the JIT techniques. Another study conducted by Swenson and Cassidy (1993) supported Fullerton and Mcwatters’s (2004) findings, showing that half of the sample changed from job order costing to process costing after adopting JIT. In addition, they pointed out that there is a difference between CASs and cost management systems, and this difference is based on the objectives.

Karmarkar et al. (1989) studied how manufacturing firms choose their cost accounting and production control systems, initially choosing 49 manufacturing companies in the USA randomly as their study sample. However, just 39 companies responded to the questionnaire. This questionnaire was divided into two parts: the first part had to be filled in by plant managers, while the second part was to be completed by plant controllers. After analysing the data gathered from the revised questionnaire, the researchers found that the choice of CASs and production control systems relied on the competition faced by the firms, the importance of the overheads, and the stability of the production process.

According to Szychta (2002), there are some factors that influence the use of CASs and these include competition, business ownership, changes in accounting legislation, and development of the money market. Szychta conducted her study in Poland using a postal survey to collect the data. A mixed method was used to collect the data. Using mixed methods overcomes the bias of using one method alone (Zillin, Xuehua, & Chenting, 2006). Szychta (2002) focused on some important issues in cost accounting, such as indirect cost allocation, determination of the selling price, transfer price determination, and product costing. However, Szychta (2002) could not generalize the results because the response rate was only about 20.7% and the sample was not randomized and was very small (Zillin et al., 2006). The sample comprised large firms from two sectors – the manufacturing and service sectors – comprising precisely 60 companies. The interview was conducted in nine firms. The large companies that were included in the sample met two of the three following criteria: average annual employment of 50 persons, sum of the balance sheet assets at the end of the financial year equivalent to 1 million euros, and net revenue from the sale of goods and products and from financial operations equivalent to 2 million euros.

Szychta (2002) indicated that to determine their product price, most of the Polish companies depend on the cost plus formula, which is widely used with full cost accounting (Guilding, Drury, & Tayles, 2005). Job order costing was found to be used to calculate the unit cost in Polish firms. Szychta (2002) could not verify whether the change of ownership and increase in competition were the main factors that influenced or caused changes in the CASs in Polish companies, because the changes in the practice of CASs in Polish companies occurred as a result of many factors besides competition and ownership, such as the need to decrease the cost and increase the profit, the use of new technology, and the need for cost information for decision making.

Wijewardena and Zoysa (1999) conducted a study using a survey questionnaire to compare the uses of management accounting in Japanese and Australian manufacturing firms. In relation to their methodology, Wijewardena and Zoysa (1999) relied on a survey questionnaire to gather data from 1000 manufacturing firms from both countries. Although Zillin et al. (2006) argued that studies employing the administrative questionnaire survey have the highest response rates, the response rate in this study was low from Japanese firms (21.7%) and from Australian firms (23.1%).

Wijewardena and Zoysa (1999) found that the management accounting uses in Japan were influenced by the culture and the business environment. In addition, Japanese firms produce low-cost products because they apply the JIT method, which reduces the inventory cost. Australian firms store more inventory than Japanese firms; moreover, Japanese firms also depend on TC, which means that they reduce the product costs during the design stage, while Australian firms rely on cost controlling tools such as standard costing, which means that Australian firms reduce the product costs during the manufacturing stage. Although Japanese firms produce low-cost products, they rarely apply ABC to allocate overhead costs. Instead, they still rely on the direct labour base. These findings contradict the view of other researchers that traditional costing methods distort product costing and lead to inappropriate managerial decisions (Cooper & Kaplan, 1988).

However, Hopper, Koga, and Goto (1999) argued that Japanese firms practise JIT; thus, these firms can increase the quality and make continuous improvements, which might be why Japanese firms do not widely use ABC. In agricultural firms, using ABC is more suitable to allocate overhead costs because nowadays machines play an important role in the agricultural process, starting from cultivating, sowing, watering, harvesting, and packaging, while in the past all the tasks were performed by workers. Lee and Kao (2000) studied the implementation of ABC in one of the agricultural activities: fishing. They claimed that the ABC system provides more accurate information for determining the product price than traditional costing.

Another study related to cost accounting in manufacturing firms, conducted by Dekkera and Smidt (2003), was aimed at investigating the use of practices that are similar to TC by Dutch firms. Specifically, Dekkera and Smidt (2003) introduced five questions: 1) Do Dutch firms use costing practices resembling TC? 2) Do they know that they are using TC? 3) Which circumstances are appropriate to use TC? 4) What are the goals that those firms want to achieve from practising TC? Finally, 5) How do they organize the application of TC? To answer these questions, they relied on a survey questionnaire, which was distributed to a sample consisting of 175 firms listed on the Amsterdam Stock Exchange, while financial, insurance, and trading companies were excluded. This was because the researchers found that due to the nature of these firms, they cannot adopt TC. However, only 32 (24%) manufacturing companies responded.

The literature related to TC answers the five questions. Dekkera and Smidt (2003) and Tani (1995) argued that the uncertain environment and intense competition force firms to reduce their costs to enable them to survive, and TC helps to achieve this goal. The literature review shows four goals of TC, namely cost reduction, quality realization, customer need satisfaction, and timely introduction of new products. With regard to the last question, Tani (1995) claimed that organizing TC needs a cross-functional team, which includes many different types of knowledge. For instance, the Japanese cross-functional team includes engineering functions, development, marketing, manufacturing, and product planning. However, accounting is the last function involved, while in Germans firms, controlling functions have an important role.

After analysing the questionnaire, Dekkera and Smidt (2003) found that Dutch firms practise TC. However, they do not know that they are practising a technique known as TC. Only one company named that system TC, while others referred to it by other names, for instance manufacturing cost reduction, pre-calculation, or cost reduction. They also found that an unpredictable environment and intensive competition can force firms to adopt TC. The most important goal of this technique is cost reduction. Two departments, production development and product design, are the most responsible for the application of TC. On the other hand, other firms that are not manufacturing firms, such as construction and service firms (information technology and transport), do not use TC because this technique is not applicable to them due to the nature of the company (Tani, 1995).

Al-Omiri and Drury (2007) studied the relationship between cost system sophistication and contextual factors. This is because the need to improve the sophistication of product costing systems is driven by global competition, cost information, change in manufacturing technology, and customers' demand for greater product diversity. To examine the influence of contextual factors on the choice of product costing, the researchers relied on nine variables: product diversity, organization size, cost structure, importance of cost information, competition intensity, business sector, quality of information technology, extent of the use of lean production techniques, including JIT, and extent of the use of innovative management accounting techniques.

To achieve these aims, Al-Omiri and Drury conducted a postal questionnaire survey to collect the data from a sample consisting of 1000 firms in the United Kingdom (UK). The response rate was 19.6% (176 firms). This response rate contradicts Zillin et al.'s (2006) statement in their study that the survey questionnaire response rate should be between 27.4% and 51.2%. However, Al-Omiri and Drury (2007) found that there is a positive association between a higher level of cost system sophistication and firm size and the intensity of competition, the extent of using other innovative management accounting techniques, and the extent of using JIT/lean production, the importance of cost information, and the type of business sector. On the other hand, the researchers found that there is no association between the level of cost system sophistication and cost structure, product diversity, and quality of information technology. Abernethy, Lillis, Brownell, and Carter (2001) did not support Al-Omiri and Drury's findings, since they found a positive relationship between the level of cost sophistication and the product diversity. Abernethy et al. (2001) argued that greater product diversity has led to inappropriate cost allocation using traditional costing; thus, using sophisticated CASs will be more suitable for product diversity. Al-Omiri and Drury's (2007) study is one of the studies that did not include agricultural firms, focusing only on manufacturing and service firms.

In addition to the previous studies, Bjørnenak (1997) studied the diffusion of ABC in the largest companies in Norway. Bjørnenak (1997) examined the relationship between the adoption of ABC and four factors: competition, cost structure, product diversity, and the existing costing system. Bjørnenak (1997) administered a survey questionnaire to a sample consisting of 75 manufacturing companies, and the response rate was 57%. To measure the competition, Bjørnenak (1997) used two proxies: 1) the percentage of products exported; and 2) the number of competitors for the major product. The statistical tests ensured that there was no relationship between the level of competition and the adoption of ABC, because non-adopters of ABC have a higher number of competitors and export rate. Only the cost structure was found to be statistically significant because companies that have a different cost structure tend to adopt ABC more than companies that have less different cost structures, which might be due to the indirect costs percentage being so high, so those firms use the ABC system to allocate overhead costs in a suitable way.

Uyar (2010) conducted a study in Turkey to identify which cost and management accounting practices manufacturing companies use in Istanbul. These included the bases that these companies use to allocate overhead costs, the product costing method they use, the problems they face in practising product costing methods, the purposes of using costing information, and the factors that make the use of cost accounting more important. After collecting data from 61 manufacturing firms using a questionnaire, Uyar (2010) found that the most widely used product costing method is job order costing, which 33 firms use, followed ABC, used by 19 firms, and then process costing, used by 7 firms.

The most common method used for allocating overhead costs was prime costs, 65%, while units produced accounted for 19.7% and direct labour costs 19.75%. The most important purpose of cost information was price decision making, followed by customer profitability, performance measurement, activity analysis, the make or buy decision, and finally the deletion and addition of products. Uyar (2010) found that food firms have the highest rate of overhead costs from the total costs of five industries (paper products and publication, chemicals and plastics, textiles, miscellaneous, and food). Finally, Uyar (2010) argued that there are four factors that increase firms' interest in using CASs: 1) crises that face the economy; 2) increasing competition; 3) increasing costs; and 4) reducing profitability. Uyar's (2010) study focused on one city in Turkey and the data were collected from a small sample. Therefore, the findings cannot be generalized. Moreover, the focus of the study was only on manufacturing firms, making it unfeasible to generalize the findings to other sectors (service and agricultural sectors).

Brierley et al. (2001a) argued that in the previous century before 1990, researchers could not find much information about product costing practice. This has led to greater interest in knowing how changes in the business environment influence the product costing uses. Because of the lack of experimental research, there has been a massive amount of criticism of product costing practices. Therefore, Brierley et al. (2001a) stated that to support or to disprove the product costing practices' criticisms, there is a need for more research about product costing practices all over the world.

Brierley et al. (2001a), in their pilot study, wanted to understand how firms calculate their product cost and how they use product costing information in decision making. To achieve these aims, they sent 42 questionnaires to management accountants in manufacturing firms, and only 50% (21) of the questionnaire were returned. To understand the practice of product costing, the researchers suggested some issues: 1) the number of accounting systems that firms use and 2) the bases used to calculate overhead rates and the use of product costing in decision making. Brierley et al. (2001a) found that firms obtained product costing information to be used in decision making in several ways, such as information taken from a single cost database used in stock valuation. Moreover, they found that firms use a variety of methods to allocate overhead costs, such as direct labour, units produced, and machine hours.

In a study involving 11 small and medium-sized enterprises (SMEs) in Japan, Hopper et al. (1999) aimed to determine whether CASs and cost management systems in Japanese SMEs are different from the systems in larger companies in Japan. SMEs are defined in their study as companies that have fewer than 1000 employees. The research targeted independent companies, which do not receive a subsidy from the Government, as well as firms in the manufacturing sector; however, one of their samples was not engaged in the manufacturing sector and two of the firms had more than 1000 workers. The targeted respondents were the managers and the employees responsible for cost accounting departments. To inform the respondents of the nature of the questions, a copy of the questionnaire was sent in advance, and one interview was conducted in every company.

Hopper et al. (1999) found that the firms studied did not implement a consistent pattern regarding the type of CAS. Five out of ten used standard costing, eight out of ten used full absorption costing, and seven out of ten used marginal costing. Some firms implemented more than one system. Six out of ten used both full and marginal costing. Marginal costing was mainly used for specific decision purposes instead of routine reporting. Large firms and SMEs used almost the same CASs; for instance, one of the medium firms was found to be applying ABC to trace overhead costs to its products. Moreover, all ten firms were calculating product costs and preparing budgets for every department.

Nine of the companies included in the study said that cost accounts were integrated with financial accounts. All of them stated that CAS information contributes to preparing financial reports as a main function. Moreover, all the respondents ensured that cost information is useful for product pricing and strategic and marketing plans. Hopper et al. (1999) stated that SMEs use relatively traditional CASs, and this practice differs from Western practice, while the differences between the SMEs lie in the processes of cost management. The study indicated that all the manufacturing firms in Japan are practising

JIT principles because JIT increases the quality and brings about continuous improvements. Therefore, all SMEs in Japan use CASs related to JIT.

Sulaiman, Ahmad, and Alwi (2004) reviewed the literature related to management accounting practices to study the implementation of management accounting systems in four countries located in Asia, namely Malaysia, India, China, and Singapore. In other words, Sulaiman et al.'s (2004) study aimed to identify the management accounting systems that are in use in the four countries, for example traditional management systems, such as budgeting, standard costing, and variance analysis, or contemporary management accounting systems, such as TC and ABC. The study found that most of the firms in the four countries are still using traditional management accounting systems, because in India, managers are conservative and avoid risks; moreover, the managers were found to be less innovative. Furthermore, high costs, a lack of skilled employees, and almost no support from the top management caused the firms in developing countries not to use contemporary management accounting systems (Majid & Sulaiman, 2008).

Quesada-Pineda (2010) focused his research on the allocation of overhead costs in the furniture industry. Quesada-Pineda showed that traditional CASs, such as the direct method (direct labour costs or direct material costs), are not appropriate bases on which to allocate overhead costs nowadays. In the past, furniture makers relied on direct labour costs to allocate overhead costs to final products. However, using direct labour at that time was appropriate because labour constituted important cost components in the furniture industry. The development of the manufacturing technology made manufacturing firms use automation in production processes more than workers, especially in the furniture industry. Hence, using direct labour as a base for allocating overhead costs was not suitable at that stage of development. Moreover, Quesada-Pineda (2010) argued that one of the ways to reduce the product costs is to classify activities into value-added activities and non-value-added activities, whereby firms will concentrate on value-added activities that are necessary to produce the product and not indulge in activities that are not necessary to produce the product. However, although implementing the direct methods is popular because they are so simple, direct methods cannot assist firms in identifying added-value and non-added-value activities in the firm. In fact, they can distort the product costs (Cooper & Kaplan, 1988; Quesada-Pineda, 2010).

There are many deficiencies in traditional costing, such as using one cost driver to allocate overhead costs (material costs or labour costs); traditional CASs also use two stages for allocating overhead costs, consisting of reporting overhead costs to cost centres and distributing overhead costs from cost centres to final products. These stages do not include cost drivers that indicate the exact consumption of every product from the firm's resources. Therefore, researchers such as Cooper and Kaplan (1988) have claimed that using traditional costing as a base for allocating overhead costs will distort the final product costs; thus, a new CAS, namely ABC, emerged in the 1980s (Cooper & Kaplan, 1988; Johnson & Kaplan, 1987). However, Quesada-Pineda (2010) claimed that the Consortium for Advanced Management – International introduced ABC in the late 1970s. Implementing ABC in the business environment can overcome all the shortcomings of traditional costing; for instance, practising ABC assists firms in identifying value-added activities and non-value-added activities, which makes the process of eliminating waste easier than when using traditional CASs. ABC can assist firms in determining the product costs more accurately; therefore, firms that work in competitive environments can benefit from applying ABC to set competitive prices. In spite of the importance of ABC in the business environment, the adoption rate of ABC in developing countries is very low, as argued by Sulaiman et al. (2004) and Maelah and Ibrahim (2006). Alleyne and Weekes-Marshall (2011) supported the idea that firms in developing countries prefer traditional CASs to ABC. Firms avoid practising ABC due to the costs that accompany its installation as well as the need for special training or employing new staff for practising CASs (Quesada-Pineda, 2010).

Relying on case studies, Alleyne and Weekes-Marshall (2011) conducted a study to explain the management accounting practices in developing countries, particularly Barbados. A semi-structured interview was used to collect data from nine respondents working in three firms. The research sample included financial controllers/accountants, production supervisors, and production and operation managers. The study found that firms in the public sector do not use contemporary management accounting systems; therefore, ABC is not widely used in the research sample, while standard costing and actual costing are widely used. Standard costing is used to discover the variances between the predetermined cost and the actual cost and the reason for those variances and to identify solutions to overcome the variances.

Alleyne and Weekes-Marshall (2011) discussed the importance of management accounting practices. Management accounting practices give useful information for decision makers to make better decisions, so implementing management accounting systems will increase the profits and control the cost. Alleyne and Weekes-Marshall (2011) argued that several factors influence firms to choose management accounting practices, such as the technology used and the information needed by decision makers.

Abdel-Al and Mclellan (2011) conducted a questionnaire survey and interviews to investigate the current state of management accounting practices in Egypt. The study's response rate was considered quite high: of the 272 firms targeted, 215 (79%) firms returned the questionnaire. However, the study found that in Egyptian manufacturing firms traditional management accounting systems are used more; for instance, 13% of Egyptian manufacturing firms practise ABC compared with 100% that apply budgeting for cost control and 33% that implement full absorption costing to determine their product costs. Abdel-Al and Mclellan's findings are consistent with studies conducted in developing countries, such as Elhamma (2012), who studied the relationship between firms' size and their practising of ABC and then the relationship between ABC and performance in developing countries.

Elhamma's (2012) study used a questionnaire survey to collect data from 62 Moroccan firms, consisting of 48% SMEs and 52% large firms in different sectors, namely manufacturing, construction, service, and commercial firms. Elhamma (2012) found that only 12% of the Moroccan firms practise ABC, while the others are most likely to implement traditional CASs. Furthermore, Elhamma found that the firms' size significantly and positively influences the firms to practise ABC, although 40% of the large firms included in his study were found to be practising traditional costing.

Elhamma’s (2012) findings supported Abdel-Al and Mclellan’s (2011) claim that developing countries still rely on traditional CASs.

Brierley (2011) compared the practices of product costing in SMEs and large firms. A questionnaire survey was used to collect data from 854 manufacturing firms in the UK. The response rate was 280 questionnaires (41.6%). Brierley found that a high percentage of SMEs practise variable costing, possibly because it is a simple CAS compared with full costing, which is widely used by large firms, and therefore most SMEs do not allocate overhead costs to product costs. The firms that practice ABC are large firms because those firms are most likely to produce several products and have many resources, which means that large firms can offer the resources to use innovative CASs more than SMEs.

From the management accounting literature, it is apparent that the majority of studies related to implementing CASs were conducted in manufacturing firms, maybe because in these firms it is easy to identify the production processes, from acquiring raw materials to making the final product. Besides, it is not difficult to determine the amount of materials used in every process and the labour needed to finish the product, while this is not the case for service firms, such as hotels or hospitals, in which the final product is intangible, as elaborated in the next chapter. Therefore, academics can find hundreds of articles related to the use of CASs in the manufacturing sector, whereas few articles can be found regarding the application of CASs in the service or agricultural sector.

3.3.2 Cost Accounting Systems in Service Firms

Odysseas and Ioannis (2007) conducted their study on hotels in Greece to ascertain the present state of CASs in Greek hotels. A total of 146 hotels were targeted but only 98 responded positively. The criteria used in the selection of the hotels were their sales revenue and profit for the year 2005. The researchers implemented a survey questionnaire to collect the data and found that three-quarters of the hotels' costs are fixed costs and also uncontrollable costs, such as the room department costs. Although Kaplan and Cooper (1997) stated that ABC is more suitable for service firms than manufacturing companies, Odysseas and Ioannis (2007) found that the majority (76.5%) of Greek hotels apply traditional costing. On the other hand, just 23.5% of the sample hotels apply ABC. Of the hotels relying on traditional costing, 58.5% were found to be using the job order costing system, while the remaining 41.5% apply the process costing system.

Focusing on CASs, Odysseas and Ioannis (2007) pointed out that hotels that apply traditional costing depend on two-stage allocation bases, whilst hotels that apply ABC use five cost drivers, namely room nights, the number of stays, sales, the number of covers, and the number of customers. Odysseas and Ioannis's (2007) study found that 52.9% of the hotels applying traditional costing or ABC apply normal costing, while the remaining 47.1% apply actual costing. In relation to cost allocation, the majority of Greek hotels allocate overhead costs using budget overheads.

Moving on to cost accounting techniques, Odysseas and Ioannis (2007) found that 76.5% of hotels apply full absorption costing while 44.7% apply variable costing. Only

20% practise standard costing. They also pointed out that firms that want to adopt ABC need to have particular characteristics, such as competition and product diversity. Roztocki and Schaltz (2003) added another factor that influences firms to practice ABC: they found that firms' size plays an important role in the adoption of ABC.

In another study, Emmett and Forget (2005) investigated how hospitals utilize the ABC system using demographic factors, namely the size (number of beds and employees), status of profit, membership of a chain, and location. Their study was conducted in hospitals in 46 USA states. They used a questionnaire to collect data from a random sample consisting of chief financial officers (CFO) in 149 hospitals. Only 7 hospitals (4.7%) implemented the ABC system, while 71.8% were aware of it. The hospitals that had implemented the ABC system stated that this system provided more accurate charging and better cost control; five of them mentioned that the decision-making process in their hospitals had improved after the implementation of the ABC system. This is approximately what Pines, Fager, and Milzman (2002) found in their study. Emmett and Forget (2005) argued that although there considerable progress has been made in the costing methodology, critical care studies have not adequately applied these techniques, which might be because there is a lack of studies that explain how CASs should be used and inform decision makers of the significance of used innovative CASs.

In addition, Emmett and Forget (2005) asked the respondents how they came to know about the ABC system, why they did not implement the system, and which CAS they were currently using. The respondents in Emmett and Forget's (2005) study pointed out that they learned about the ABC system from conferences, courses, and magazines, and

95 or 36.8% of the respondents stated that they did not apply ABC because of the high cost of implementing this system. Some answered that they were satisfied with their current CAS, which means that they gain the cost information needed to manage the hospitals from the existed CASs; others reported that they did not have enough experience with ABC. However, 20 were planning to use this system in the future. Finally, the study found that only location had an impact on the hospitals' familiarity with ABC, as compared with the other demographic factors, which might be due to the intensity of competition in large cities being greater than in rural areas where there are only a few hospitals, so there is no choice for the patients, like there is in large cities.

Mostaque, Gunasekaran, and Erkki (1998) claimed that the management accounting system can help firms to survive in competitive markets, and this includes not only manufacturing firms but also service firms such as banks. However, they focused their study on service firms only, excluding agricultural and manufacturing firms from their study. They used a postal survey method to collect data based on a questionnaire. This supported what Zillin et al. (2006) argued in their study: most of the researchers in the six best international business journals (from 1992 to 2003) administered survey questionnaires and conducted personal interviews. The study collected data from 100 Finnish service firms on CASs, proper cost allocation to different products, the level of satisfaction in allocating product costs, and the shortcomings of the existing CASs and ABC. The findings suggest that in Finnish service firms, the use of management accounting systems is not very successful for achieving the goals of decision making, planning, management control, and improving the overall performance of the information system. They also stated that there are some service firms in Finland that have achieved at least some of the goals.

One of the difficulties in service firms concerning CASs lies in identifying the product, because these firms offer intangible products. Brignall, Fitzgerald, Johnston, and Silvertro (1991) studied product costing in the service sector, focusing on five firms – a management consultancy firm, a hotel chain, a transport company, a news agency chain, and a clearing bank. They found that to achieve the goals in the service firms, such as determining the service price, management control and inventory valuation, and service costs, the final product needs to be identified. However, in some service firms, service costs are not used for inventory valuation because the nature of the service cannot be stored. Furthermore, Brignall et al. (1991) found that all the organizations included in the research sample used full product costs to set their selling prices, while service firms relied on responsibility centres to plan and control costs.

Pavlatos and Paggios (2009) conducted research to examine the factors that influence the design of CASs in hotels. They wanted to identify the relationship between cost system functionality and some of the contingent factors. According to Pavlatos and Paggios (2009), cost system functionality is defined as “the quality of cost accounting information which is provided by a cost system” (p. 264). Pizzini (2006) argued that a functional cost system has to provide detailed data, frequent cost information reports, improved classification of costs according to behaviour, accurate cost data, and the calculation of more variances. Pavlatos and Paggios’s (2009) study sample consisted of 100 hotels in Greece and investigated the association between cost system design and six factors, namely the extent of use of cost data, the low-cost strategy, the level of competition, the hotel size, the number of services and products, and the membership of a multinational chain.

Pavlatos and Paggios (2009) used two tools to collect the data, namely a questionnaire and a semi-structured interview. Besides these, they used measures from other researchers to measure the strategy, the level of competition, and the size. These measures are reliable because they have been used before in other studies, meaning that the items have been examined twice. After analysing the data, they found that only 24 hotels used functional CASs by providing costs according to individual services, customers, rooms, etc. They also classified costs according to behaviour and reported monthly cost data.

Although such cost systems use modern cost techniques such as ABC, another study, by Odysseas and Ioannis (2007), found that hotels in Greece use traditional cost systems. Traditional CASs, according to other researchers, distort the product costs (Cooper & Kaplan, 1988). With respect to the independent variables, Pavlatos and Paggios (2009) found that there is a positive relationship between the level of cost system functionality and low-cost strategy and the extent to which the cost data are used, whilst there is no relationship between the hotel size, the number of service variants, the level of competition, and the status of the hotel, that is, whether it is a member of a multinational chain.

One study, conducted by Hill (2000), concentrated on the use of CASs in hospitals. The study aimed to examine how environmental and organizational factors (size, ownership, location, occupancy rate, competition, revenue constraint, and membership of a multi-hospital system) influenced hospitals to adopt CASs during the period between 1980 and 1990. To achieve this, Hill (2000) conducted a mail questionnaire to collect data from a random sample consisting of 1660 hospitals. This sample was selected from 5583 hospitals in the USA. The response rate was 35.4% (589). The data analysis suggested that the adoption rate among the hospitals increased dramatically between 1980 and 1990. From 1984 to 1985, 38 hospitals used costing systems, while 60 hospitals adopted CASs from 1986 to 1987, and more than 100 hospitals used costing systems between 1988 and 1990.

With respect to the relationship between the organizational and environmental factors and the use of costing systems, Hill (2000) found that there is a positive relationship between the use of costing systems and the hospital size, ownership, occupancy rate, competition, and revenue constraints. Besides, hospitals that are part of a multi-national hospital system are more likely to adopt costing systems than independent hospitals, while hospitals that are located in rural areas are more likely to use relatively unsophisticated methods than urban hospitals. For instance, inner-city hospitals are more likely to have no costing system because they lack resources and are neglected by the government.

Another study concerned with ABC in service firms was conducted by Majid and Sulaiman (2008). They carried out a case study to explore the difficulties and benefits of practising ABC in Malaysia and tried to identify the factors that influence firms to adopt ABC. Face-to-face semi-structured interviews and documentation analysis were used to collect data from two companies, CM and TM, to investigate the problems they faced during the implementation of ABC and the benefits they gained. The literature suggests that ABC has many benefits, such as increasing profits, influencing strategic managerial decisions, process improvement, and eliminating non-value-added activities (Innes, Mitchell, & Sinclair, 2000; Majid & Sulaiman, 2008). There are also some difficulties involved in implementing ABC, including the cost of implementing this method due to the time spent on determining the cost drivers as well as the need for additional accounting staff (Innes et al., 2000). The second problem is gathering the data from the employees. All of these difficulties make many firms reject ABC.

After analysing the data gathered, the CM company expressed that it implemented ABC because it works in a competitive environment, so ABC has enabled it to improve the company’s strategic product pricing and facilitate the improvement.

According to Abrahamson (1991), there are three perspectives to the adoption of ABC: 1) the efficient choice perspective, 2) the forced selection perspective, and 3) the fads or fashion perspective. The accounting literature indicates that most of the firms that have adopted ABC were influenced by one of these perspectives.

Arnaboldi and Lapsley (2005) suggested that four stages are needed to implement ABC, namely initiation and adoption, design, implementation, and use of the information. Majid and Sulaiman (2008) applied these steps in their study. They found that the CM company initiated ABC from its headquarters in the USA. The president of the sector chaired a committee to set a steering committee and project team. The design stage started when both committees travelled to Malaysia. The two teams worked with the production personnel, in-house accountant, and external consultants to identify the activities and the cost drivers for the company. Then, they started the third stage, which was to train the company's employees to use the system. Finally, the costing manager mentioned that ABC provides useful cost information for several purposes, including cost reduction, determining the product pricing, and customer profitability analysis.

The CM company was a multinational company; therefore, it could overcome the difficulties faced easily. Majid and Sulaiman (2008) argued that both firms faced the same problems. They also found in the literature that the high cost was a result of buying new and up-to-date software. They spent much time on identifying cost drivers. In addition, ABC made the companies' manufacturing process more efficient. It identified the profitable activities and non-value-added activities, while the accurate cost information provided by ABC made them competitive within their industry.

In the TM company, the finance division managers suggested initiating the implementation of ABC. Then, a cross-functional team formed a committee chaired by an expert in strategic cost management. They started designing ABC by identifying the relevant cost pools, activities, and cost drivers. They brought in external consultants to train the employees on how to use ABC. However, they did not introduce ABC in all the divisions of the company, because they had two costing systems, one for capital expenditure decisions and ABC for daily operating expenditures. They implemented

ABC for two reasons: the increase in competition and the fact that traditional costing systems provided them with unreliable information. In terms of difficulties, they mentioned the high cost accompanying ABC's application and the technological change. After implementing ABC, the TM company gained many benefits; for example, it enabled managers to make informed decisions, reduced wastage, and identified profitable customers and high-cost activities as well as non-value-added activities. Although Majid and Sulaiman (2008) investigated how to implement ABC in firms, they conducted a case study; therefore, the results cannot be generalized (Mills, Durepod, & Wiebe, 2010).

Carenys and Sales (2008) conducted a study to identify the CASs used in banks. A questionnaire survey was used to collect data from 47 saving banks in Spain during the year 2006; out of 47 questionnaires sent by post to the heads of management control of all the Spanish savings banks, only 26 questionnaires were returned, representing a 55.3% response rate. The use of management accounting systems in banks was delayed for many reasons, for instance the nature of work in the banking sector differing from that in manufacturing firms and the difficulty in differentiating between the output and the input or determining the final product, as in the manufacturing sector. Moreover, according to Carenys and Sales (2008), there was no harsh competition in the banking sector before the 1980s to make banks implement management accounting systems for planning and cost control.

Increasing competition made banks pay more attention to implementing CASs in terms of allocating overhead costs to reduce the services' costs. Carenys and Sales (2008) found that because of the many services offered by savings banks, ABC is more appropriate for allocating overhead costs. Therefore, Spanish savings banks should move from practising traditional costing, such as partial costing or full costing, to implementing ABC in order to survive in competitive environments.

The study conducted by Cropper and Drury (1996) encompassed one of the neglected topics in management accounting studies, specifically management accounting implementation in universities. Many changes have occurred in the education systems in many countries, such as a decrease in government subsidies, which has made universities maintain their wealth and look for other resources to be able to survive.

Cropper and Drury's (1996) study was conducted to provide information about the nature and role of management accounting systems in UK universities. Cropper and Drury (1996) used two methods to collect the data related to their study, namely questionnaire and interview. First, a questionnaire was sent to all UK universities by post, and then interviews were conducted with the universities' finance officers. The results indicated that the majority of the universities were interested in analysing their profit. However, in relation to the CASs implemented in UK universities, the survey indicated that most of the universities prefer direct costs plus a fixed percentage of overheads for allocating costs to commercial activities, for instance consultancy. The cost plus system is simple to use; however, it cannot explain the consumption percentage of every activity from overhead costs accurately. The cost plus approach supposes that all activities consume resources equally. As a matter of fact, allocating overhead costs in this way distorts the product costs (Cooper & Kaplan, 1988; Quesada-Pineda, 2010).

Moreover, this is one of the reasons that made accounting researchers look for modern CASs to allocate overhead costs appropriately.

Cropper and Drury (1996) reported that 35% of their study sample use full cost accounting systems to determine the cost of running degree courses, whilst 27% of the sample consider ABC to be the most appropriate system for UK universities. A total of 57% of the sample used the direct cost plus a fixed percentage overhead.

3.3.3 Cost Accounting Systems in Agricultural Firms

There are very few studies on CASs in the agricultural sector. Academic research on agricultural management lacks qualitative and quantitative empirical studies, as argued by Juchau (2000) and Argilés and Slof (2001). Although Arthur Young in the eighteenth century referred to the importance of CASs in agricultural firms (Juchau, 2002), in 2010 there were still accounting researchers who were suggesting that more attention should be paid to CASs in agriculture (Athanasios et al., 2010). According to Athanasios et al. (2010), the agricultural sector does not receive much attention from accounting researchers, practitioners, and standard setters. Among the reasons for this is the low level of managerial sophistication and the lack of economic means in agriculture. According to Kroll (1987) and Sabate and Encise (1997) (as cited in Athanasios et al., 2010), this is because the farm size and legal practices of European farms mean that they have no legal obligation to publish financial statements. Farmers who prepare accounts prepare them to comply with the tax framework and subsidy requirements.

Cost accounting in the manufacturing sector has gained much attention from researchers and standard setters. This is not the case in agriculture. Researchers and standard setters do not pay much attention to this field of knowledge. Tahir et al. (2004) restated what others have said. According to Tahir et al. (2004), the agricultural sector has not been given much attention by standard setters and accounting practitioners and accounting studies in farming are not as numerous as those in other sectors. The development of agricultural tools and the use of developed technology in farming have led to important modifications in the cost structure and cost behaviour, especially in the agricultural firms that produce more than one product, in which the indirect cost constitutes a large percentage of the total costs; therefore, farmers should know their production costs to stay profitable. In addition, Argilés and Slof (2001) revealed that there is a gap between the importance given to accounting and the low level of bookkeeping and accounting practices in agriculture. In their view, the current general accounting rules do not adapt very well to the particularities of farming. Therefore, it is difficult and expensive to implement these rules in farming. Argilés and Slof (2001) also agreed with Athanasios et al. (2010) that agricultural management suffers from a low level of managerial sophistication and a lack of economic means.

Jack and Jones (2007) explained that management accounting in farming has received very little attention from accounting researchers. The researchers also argued that agriculture is undergoing significant changes and adjustments nowadays. Hopefully, these changes can bring about changes in accounting practices. According to Luening (1989) and Allen (1994) (as cited in Argilés & Slof, 2001), the implementation of accounting in agricultural firms can improve farm management and lead to better farm performance.

Farmers can increase their profits if they implement CASs in their farms. Tahir et al. (2004) argued that the significance of cost control in farming operations is its ability to increase the profit. According to them, farm costing is useful for monitoring plantation expenditures, which increase as farming becomes modernized. To achieve this, cost information ought to be supplied adequately and in a timely manner. In support of this, Toluyemi (1999) discussed the importance of accounting information systems in helping managers to make informed decisions in agricultural development projects.

However, only a small number of empirical studies have focused on management and accounting in farming in general, for instance the studies carried out by Toluyemi (1999) and Lee and Kao (2000). Toluyemi (1999) examined the accounting information systems in the agricultural department projects in Nigeria and suggested improvements to accounting information systems to facilitate sustainability among the agricultural department projects.

In terms of the methodology used, Toluyemi (1999) conducted unstructured interviews to collect data to achieve the study’s objectives. The data were collected from financial and non-financial managers in the agricultural department’s projects, while the sample was selected randomly. The interview focused on the relevance of accounting information to establishing good organizational priorities, management awareness, and a decision support system. According to Toluyemi (1999), if companies want to achieve sustainability, they have to concentrate on cost-effectiveness through the reduction of wastage and cost control by way of accounting information to support decision making, through planning, analyses, and control. Planning involves selecting the best alternatives. This is achieved by analysing the past situation, knowing the current situation, and predicting the future situation, while control involves making sure that the implementation is carried out according to the plans.

Lee and Kao (2000) reported in their study that they applied both the ABC model and the simulation technique to analyse the operational costs in the Pu Shin wholesale fish market in Taiwan. The ABC system is a system that assigns costs to activities then assigns these costs to the units that consume these activities. Many industries have successfully employed the ABC system to improve their operational performance and cost management.

Lee and Kao (2000) hoped to use this system in agricultural firms. They based this on the data obtained from a case study. To apply the ABC system in the wholesale fish market in Taiwan, they undertook four steps. 1) They determined the activities, finding six activities in five sections. The sections were the cultured fish section A, cultured fish section B, cold storage polyester box section, cold storage fish basket section, and imported fish section. In each section, there were six activities: unloading, ordering, billing, grading, weighing, numbering, auctioning, and administrative operations. 2) The allocation of resource costs. According to Ostrenga (1990, as cited in Lee & Kao, 2000), allocations can be classified into two categories: direct charging and estimation, which means allocating resource costs by using resource drivers and arbitrary allocation. They used direct charging and estimation charging. 3) The computation of the resource costs. To ascertain the duration of each operation, they installed a v8 camcorder. They recorded the time of every operation to determine how much each operation costs. They computed the processing cost of each kilogram of fish. They found that using ABC will help managers to determine the product price accurately and this is better than using traditional costing.

Another study, conducted by Foong and Teruki (2009), aimed to study the relationship between the cost system functionality and the performance in oil palm firms. They wanted to determine whether managers' perceived usefulness of cost information mediates the cost system functionality–performance relationship. In their study, the researchers conducted a mail survey questionnaire to collect data from 179 oil palm firms in Sarawak.

After analysing the data, Foong and Teruki (2009) found that there was a positive association between cost system functionality and performance and managers' perceived usefulness of cost information, only partially mediating the cost system functionality and non-financial performance relationship. This is possibly a result of the nature of control over the estate operations by the head office. However, they claimed that providing cost details does not enhance performance. Cost information should be relevant and timely to be more useful to managers to increase performance. Furthermore, they argued that a highly functional cost system is associated with high performance. Although they obtained these results from the data analyses, the sample was extracted from one area in

Malaysia and the respondents were not accountants but experts in plantations; therefore, the results may have differed if the respondents had been accountants.

Argilés and Slof (2003) studied the relationship between using financial reports in decision-making processes and farm performance. The questionnaire was their chosen instrument to collect data from 170 farms. They measured the performance by using three measures: the output, efficiency (asset turnover), and profitability (return on assets). The independent variable was accounting use; however, they used control variables because in farming, there are other factors that influence the performance, such as the resources employed, namely, the size, farmers' experience, type of farm, and farm location. The researchers relied on economic size units (ESUs) to compare farms that are completely different in product orientation. These standardized measures of size were developed by the EU to compare farms from different regions and different types of farming.

According to the Farm Accountancy Data Network (FADN), there are five types of farms: field crops, permanent crops, granivore (pigs and poultry), dairy and dry stock, and mixed orientation. In terms of location, there are three types: the favoured zone, mountain zone, and normal zone. Finally, Argilés and Slof (2003) used the farmer's age as a proxy for experience. After analysing the data, they found that the farmers who used financial reports in decision making performed better than those who did not. The researchers stated that to understand how accounting information enhances performance, in-depth observation of farmers' actual use of financial reports for management decisions is needed. These results were derived from large agricultural firms; therefore, it was difficult to generalize the results to small and medium-sized farms. On the other hand, old farmers have more experience than young farmers, so they manage their resources to maximize productivity.

McBride (2003) conducted a study to examine the extent to which farmers in the USA cover costs and why different farms incur different costs. First of all, McBride (2003) argued that in farming, there are three types of decisions: 1) daily decisions related to input usage, 2) decisions related to determining what to plant, known as seasonal decisions, and 3) long-term plans, such as buying new machines or renting new land. Therefore, the costs in agricultural firms are divided into two types: operating costs, which are related to short-term decisions, and asset ownership costs.

McBride (2003) found that in the years 1998 to 2001, the agricultural product prices were low, and 85% of wheat producers, 82% of corn producers, and 96% of soybean producers could cover their operating costs. Therefore, most of these producers continued to produce the products. When the researcher added asset ownership costs, the percentages were different: 50% of wheat and corn producers and 25% of soybean producers were unable to cover both operating and ownership costs at the average commodity prices during the period between 1998 and 2001.

McBride (2003) studied the effects of farm operators on production costs using three dimensions: operator age, education, and occupation. McBride (2003) found that most low-cost producers were less than 50 years old and had attended more classes than high-cost producers. This is because in low-cost production, younger and more educated farmers are more capable of adopting production practices and using modern technologies that might decrease the product costs and increase the farm productivity. On the other hand, farm employment affects the production costs as well. McBride (2003) found that 60% of the farmers in the USA have another job besides farming, 40% of farmers work only in farming, and 94% of low-cost hog producers stated that their job was only farming while only 6% were high-cost producers.

Furthermore, McBride (2003) found that the farm location influences the production cost. Farms that are located in good areas with a good climate and soil are more likely to produce low-cost products. For instance, most of the corn and soybeans of low-cost producers were from farms located in areas with high-quality soil. On the other hand, farms that were located in areas with a large amount of rain had reduced irrigation costs. In addition, the farm size influences the production costs. In relation to input costs, farmers with large farms have the opportunity to obtain discounts from wholesalers. Moreover, the operating costs are distributed across more products, so if the production increases, the share of one product cost decreases.

According to Juchau (1986), agricultural firms should use accounting systems, especially if they are suffering from financial constraint, because management accounting systems make an important contribution to enabling farmers to make better decisions to improve their performance. The current accounting systems are mainly used to prepare external reports, especially for tax purposes; therefore, Juchau (1986) claimed that management accounting in agricultural firms has received little attention from accounting researchers and practitioners as well. On the other hand, Juchau suggested that the farm size, farm activities, farm resources, and ownership structure determine the nature and scope of management accounting systems in agricultural firms. Large agricultural firms that are capital-intensive and produce several products need to allocate the resources appropriately to determine every product cost separately, whereas for small farms that produce one product, it is easy to determine the product cost and there is no need for sophisticated CASs. Juchau (1986) found that farmers do not have a good understanding of many of the management accounting techniques that can assist them in improving their decision making. To assist agricultural firms' managers and to fill the gap in the literature, researchers advocate accounting researchers to conduct more research about the use of CASs in agricultural firms.

Jack (2008) claimed that although TC management is not currently in use in agricultural activities, TC is a potential system for use in the agricultural sector. Jack and Jones (2007) argued in favour of the same idea in their study. Furthermore, Jack (2008) explained that farmers use what could be termed an intuitive form of TC. Farmers rely on the prices in previous years to forecast potential prices to set target costs and then redesign their operations in order to achieve those targets. However, Jack (2008) found that some factors make the practice of TC in agricultural firms difficult; these factors include the need for detailed cost information and monitoring reports. To achieve these, firms need multidisciplinary teams. However, agricultural firms have started to collect data to enable TC to be applied in farming.

In palm oil firms, Ismail, Simeh, and Noor (2003) discussed the production cost structure for independent smallholders and then compared the results with their counterparts (organized smallholders) and estates. The researchers stated that the Malaysian oil palm smallholdings sector is divided into two types: 1) organized smallholders and 2) independent smallholders. Organized smallholders refer to those who participate in public land development schemes, such as the Federal Land Consolidation and Rehabilitation Authority (FELCRA); these governmental agencies provide organized smallholders with technical advice and input supply and market their products. Independent smallholders establish their firms individually and receive less support from the Government.

The authors conducted a survey to collect data from randomly chosen samples from four categories, from Johor state, namely Batu Pahat, Muar, Kluang, and Pontain. The justification for selecting these areas was that around 89.6% of the total independent smallholders in Johor live in these districts. The study found that the production cost in oil palm firms consists of five sub-centres: upkeep, fertilizer application, harvesting, transportation, labour, and other costs.

The upkeep costs include maintaining the field roads, path, bridges, etc. and replacing dead palms, weeding, and pruning the oil palms. They found that the cost of the upkeep is up to RM 385.14 for every hectare or RM 24.3 for every ton of fresh fruit bunches. This information is based on data collected in 2000. Moreover, they found that the most important item in the upkeep costs is weeding, because it constitutes around 50% of the total cost, while other items constitute the other half of the upkeep costs. Fertilizer application refers to two items, namely fertilizer purchase and labour; the fertilizer purchase constitutes 93% of the total fertilizer cost and the labour cost constitutes only

7%. Under the harvesting cost, there are three items: harvesting, collecting, and harvesting tools. Every hectare costs RM 525.01 for harvesting and collecting, which constitutes 93% of the total harvesting cost. This is normal because 56% of the independent smallholders hire harvesters to perform the harvesting and collecting jobs. Harvesting tools constitute about 7% (RM 39.47).

The labour cost is the most important input in the oil palm firms, because every stage and machine needs workers to finish the job. Therefore, labour constitutes a large share of the oil palm production cost. The labour cost includes workers who have steady salaries and workers hired to accomplish specific jobs. In relation to the transportation cost, there are two stages: 1) in-field transportation, which means transporting the fresh fruit bunches from the fields to the storehouses, and 2) transporting the crops from the storehouses to the mills. Ismail et al. (2003) found that the in-field transportation cost is RM 68.37 for every hectare; on the other hand, the transportation of fresh fruit bunches from storehouses to mills costs RM 305.11 per hectare. Furthermore, there are other costs, including land quit rent and other expenses; the researchers found that the quit rent is RM 22.85 per hectare, while other expenses equal RM 65.53 per hectare.

In brief, harvesting and collecting work constitutes 31.8% of the production cost for independent smallholders, then the upkeep costs, which represent 22%, followed by the transportation cost of 21%, then the cost of fertilizer of 20%, and other expenses of 5%. Ismail et al.'s (2003) study focused on understanding the cost structure in the oil palm production for independent smallholders; however, this study did not mention management costs and overhead costs.

In this thesis, the literature review suggests that CASs have been implemented widely in manufacturing sectors since its advent (Fleischman & Parker, 1991). Fleischman and Tyson (1993) and Ning (2005) argued that the Industrial Revolution, which happened at the end of the eighteenth century, was the starting point that brought about the development of CASs. Therefore, most accounting researchers have paid a lot of attention to this system in the industrial sector.

The researcher found many studies related to CASs in this sector. Some of them are normative without statistical data and others with statistical data. On the other hand, in the service sector, there are many studies related to the use of CASs, such as Brignall et al. (1991), Janet and Gus (1996), and Arnaboldi and Lapsley (2005), while there are a few studies that focused on the practice of cost accounting in farming, including the studies by Juchau (2002), Argilés and Slof (2003), and Athanasios et al. (2010). All these researchers argued that accounting researchers should pay more attention to CASs in agricultural activities.

Therefore, this study's theoretical contribution is made to the body of literature about CASs in agricultural activities. The empirical contribution helps to determine which cost accounting methods are appropriate for agricultural firms in Libya and how agricultural firms use CASs.

3.4 Factors Influencing the Use of Cost Accounting Systems

3.4.1 Size

It is generally agreed that organization size is one of the important factors that affect the use of CASs (Khandwalla, 1972; Obara & Ukpai, 2001; Abdel-Kader & Luther, 2008; Pavlatos & Paggios, 2009; Elhamma, 2012). According to Chenhall (2003), size is considered to be one of the previous contingency theory variables. Many researchers have studied the relationship between the firm size and the use of CASs. For instance, Roztocki and Schaltz (2003) claimed that there is a relationship between firm size and ABC usage. This means that with the increase in firm size, there is an increase in the usage as well. Roztocki and Schaltz (2003) found that in firms with more than a hundred employees, 70% of the accountants and 45% of the managers are familiar with ABC as compared with 36% of the accountants and 16% of the managers in firms with fewer than a hundred employees. Al-Omiri and Drury (2007) conducted a study aiming to examine the extent to which different contextual factors have an influence on the choice of product costing systems. However, they found that there is a positive relationship between the firm size and a higher level of cost system sophistication. Al-Omiri and Drury (2007) studied manufacturing and service firms and did not include agricultural firms.

Another study, conducted by Baird, Harrison, and Reeve (2004), aimed to examine the extent of adoption and the influence of organizational and cultural factors on the adoption of MAPs. The researchers found that there is a relationship between the business unit size and all MAPS, such as ABC. In addition, Pavlatos and Paggios (2009) studied the factors that affect the cost system design in hotels; the researchers claimed that the size is the most common internal factor that has been examined in relation to cost accounting systems.

Cadez and Guilding (2008) conducted a study to investigate the integrated contingency model of strategic management accounting. To achieve the aims of this study, the researchers adopted the mixed-method research design using a questionnaire and interviews to collect the data. The interview results suggest that there is strong support for a positive relationship between company size and greater strategic management accounting usage. Only one interviewee stated that there was no relationship between them.

Abdel-Kader and Luther (2008), in their study, examined the impact of contingent variables on a broad set of MAPs, in a sample selected from the UK's largest firms. The organization size was one of the variables investigated. The researchers stated that the firm's size was considered to be one of the important factors that affect MAPs, because larger firms have the resources to adopt more sophisticated MAPs than smaller firms. The researchers found that there is a relationship between the firm size and the adoption of sophisticated MAPs.

Emmett and Forget (2005) conducted a study to ascertain how hospitals utilize the ABC system using demographic factors, including size, profit status, membership of chains, and location. After analysing the data, the researchers found that only location had an impact on hospitals' familiarity with ABC as compared with the other demographic factors. This means that hospital size does not influence the use of ABC, as stated by Emmett and Forget (2005).

3.4.2 Level of Competition

The level of competition is one of the factors that influences the use of CASs (Szychta, 2002; Kachalay, 2012). For instance, Hume-Schwarz (2007) argued that due to a lack of competition, managers were previously able to make decisions about profit margins; however, this is not the case since the competition increased. Ning (2005) claimed that competition intensity and customer demands gave rise to companies demanding accurate product costing systems to achieve cost control and cost reduction. Mia and Clarke (1999) claimed that the intensity of competition is a determinant of management accounting systems. Furthermore, Al-Omiri and Drury (2007) found that a higher level of cost system sophistication is positively related to the intensity of the competitive environment.

Haldma and Lääts (2002) argued that intensive competition influences the application of cost management and control. Karmarkar et al. (1989) claimed that the choice of CASs in manufacturing firms relies on many factors, one of them being the competition faced by the firms. Tani et al. (1994) and Dekkera and Smidt (2003) claimed that the intensity of competition is one of the factors that forces firms to reduce their costs to be able to survive in the industry, and if the firms want to use ABC, they have to have certain characteristics, such as competition (Odysseas & Ioannis, 2007).

Pavlatos and Paggios (2009) argued that there is no relationship between the cost system functionality and the level of competition in the hotel sector. There is also no relationship between the hotels' level of competition and the design of CASs. Hill (2000) claimed that there is a relationship between the adoption of a costing system and the intensity of competition. Hill argued that competition alone is not a critical variable in the adoption of costing systems in hospitals but both competition and revenue constraints together lead hospitals to adopt costing systems.

Similarly, Bjørnenak (1997) studied the relationship between the adoption of ABC and four factors, of which competition was one. Bjørnenak used two variables to represent competition, specifically the number of competitors and the percentage of exported products. Bjørnenak (1997) found that non-adopters of ABC have a higher number of competitors and a higher export rate. Therefore, there is no relationship between the level of competition and the adoption of ABC. Furthermore, Uyar (2010) stated that competition is one of the factors that increases the importance of the use of CASs in organizations.

Furthermore, Geiger and Ittner (1996) argued that competition is considered to be one of the factors that encourages managers in government organizations to implement CASs. This is because managers in the private sector also face stiff competition, which will increase the benefits of using more sophisticated CASs, because the competitors will rely on any wrong decisions made based on inadequate cost information. In addition, Geiger and Ittner (1996) argued that contingency theories maintain that CAS use should be positively related to the level of competition faced by the organizations. On the other hand, Szychta (2002) stated that according to the returned questionnaires, it is difficult to prove that an increasing level of competition leads to changes in cost and management accounting implementation in Polish firms.

3.4.3 Product Diversity

One of the factors that causes cost distortion is product diversity because products consume different proportions of resources (Tayles & Drury, 2003; Schoute, 2011). Firms that produce more than one product should implement CASs to determine each product cost separately. Some researchers, such as Cooper and Kaplan (1988), have argued that firms that produce several products should implement sophisticated CASs, such as ABC, if they want to determine the cost of every product adequately, because practising traditional costing will distort the product costs. Tayles and Drury (2003) supported Cooper's (1988) statement, arguing that greater product diversity needs a more sophisticated CAS to determine the variation in resources' consumption by different products.

There are three types of product diversity: 1) process diversity, 2) volume diversity, and 3) support diversity. Process diversity indicates variances in consumption among all the activities relating to product design, product manufacture, and distribution. Volume diversity means that firms produce products in different batch sizes, while support diversity indicates different support given to products by several support departments.

Abernethy et al. (2001) examined the relationship between product diversity and the design of CASs. They found that there is a positive relationship between product diversity and the choice of costing systems. Firms with a low level of product diversity usually choose a low level of costing system sophistication and vice versa. Product diversity includes production volume diversity, size diversity, set-up diversity, material diversity, and complexity diversity (Bjørnenak, 1997).

Abernethy et al. (2001) and Odysseas and Ioannis (2007) argued that it is better for firms that produce more than one product or service to use ABC to be able to allocate overhead costs accurately to all the products. Furthermore, Malmi (1999) studied the factors that encourage firms to adopt ABC. One of those factors is product diversity. Malmi found that this factor is positively correlated with the adoption of ABC. This result was supported by Schoute (2009), who claimed that product diversity is the most important determinant of the use of ABC, because the more complicated the production process, the more complex the CAS. Moreover, Schoute (2009), in his study, examined the relationship between the adoption of ABC and product diversity. Schoute found that product diversity is positively related to the use and adoption of ABC. In contrast, Clarke, Hill, and Stevens (1999) found that the relationship and the use of ABC and product diversity is not significant.

Obara and Ukpai (2001) found that the reason why most artisans do not use CASs might be because every artisan produces only one product; thus, all the costs will be traced to that product; the use of CASs in firms in which there is no diversity in the production may cost the firms more than its benefit. Furthermore, Al-Omiri and Drury (2007) found that the product diversity does not influence firms to use sophisticated CASs, which contrasts the findings of many researchers, such as Schoute (2009), who stated that product diversity is one of the factors that make firms use more sophisticated CASs, such as ABC.

3.4.4 Cost Structure

A change occurred in the total costs for products when the labour costs decreased and the overhead costs increased as a result of changes in production technology (Johnson & Kaplan, 1987), and this led firms to use not only CASs but more developed CASs, that is, ABC (Brierley et al., 2001b). Bjørnenak (1997) examined the factors that influenced the diffusion of ABC in Norway. These factors included the competition, product diversity, existing costing system, and cost structure. Bjørnenak found that only the cost structure is statistically significantly related to the diffusion of ABC. Bjørnenak (1997) argued that firms that have different cost structures adopt ABC more than companies that do not.

Brierley et al. (2001b) argued that the cost structure determines whether firms choose to use sophisticated or non-sophisticated costing systems. For instance, if the indirect costs are low in an industry, there is no need to invest in sophisticated CASs. On the other hand, Karmarkar et al. (1989) claimed that the choice of cost accounting and production control systems depends on three factors, one of them being the significance of overhead costs. On the other hand, Clarke et al. (1999) and Malmi (1999) contradicted other researchers when they found that there is no significant relationship between the cost structure and the use of ABC.

In another study, Lukka and Granlund (1996) analysed the state of CASs in Finnish manufacturing firms. The researchers claimed that the cost structure is an important factor that influences the implementation of costing methods. This opinion was supported by Tayles and Drury (2003), who argued that the percentage of indirect costs does not just make firms use CASs but makes them choose either traditional costing or ABC. If the direct cost constitutes a high percentage of the total costs, firms should not invest in sophisticated CASs. However, if the indirect cost is more than the direct cost, firms should implement sophisticated CASs because traditional cost accounting systems will distort the product costs. Al-Omiri and Drury (2007) contradicted other studies when they found that there is no relationship between the use of sophisticated CASs in firms and the cost structure, as proved in their study.

3.4.5 Importance of Cost Information

The need for cost control, inventory valuation, and managerial decision making encourages firms to use CASs, especially in a competitive environment (Ning, 2005), in which competitors try to introduce their products at lower prices. This is possible by reducing the production costs. Tayles and Drury (2003) claimed that the basic role of CASs is to provide decision makers with cost information to manage the cost of the existing activities, services, products, and customers. CASs provide relevant cost information to identify profitable and unprofitable activities and to ensure that only profitable activities are undertaken.

According to some types of cost information, decision makers will need to choose the type of CAS to use. If the production system is simple and most total costs are direct costs, it is not worthwhile investing in sophisticated cost accounting. Traditional costing can help to provide the required cost information (Roztocki & Schaltz, 2003). However, if the production system is more developed or sophisticated, traditional costing will be of no benefit. ABC will be more appropriate for this production system (Brierley et al., 2001b). According to Anderson (1995), different types of cost information for decision making, cost reduction, and cost control may cause firms to use specific types of CASs. These findings are supported by Alleyne and Weekes-Marshall (2011), who argued that the information needed for decision making influences firms to use management accounting systems. Likewise, cost information is so important that it encourages firms to use specific types of costing systems (Kaplan & Cooper, 1998). The increased importance of cost information makes firms use more innovative CASs, such as ABC; if the firms use high-tech machines to produce a variety of products, determining the product cost for every product will become difficult because of the increase in overhead costs that need to be allocated appropriately (Al-Omiri & Drury, 2007).

It is argued that when the cost information is not particularly important for decision makers, firms use simple CASs and avoid implementing sophisticated CASs. For instance, because universities are subsidized by governments, the cost information is not especially important for decision making to manage the universities' resources; therefore, universities in the UK use traditional CASs, such as full costing (Cropper & Drury, 1996). Moreover, artisans who have small shops and rely on market prices for raw materials and finished goods usually do not use CASs, because cost information is not important to them (Obara & Ukpai, 2001).

3.4.6 Legal Obligation

Some studies have suggested that CASs are implemented in some organizations for the purpose of meeting regulations and abiding by the legitimacy of the organizational activities to create the impression to external stakeholders that the organizations are very well controlled in their operations.

According to the literature review, most of the researchers have argued that a lack of legal obligation affects the use of CASs in agricultural firms. For instance, Athanasios et al. (2010) claimed that European farmers do not publish financial statements because of the lack of legal obligation, and this finding is supported by Argilés and Slof (2003). The fact that agricultural firms in the private sector in Libya do not use accounting systems might be because they are not subject to income tax, so most of them do not keep records or publish financial statements; moreover, those firms rely on the market to determine their products' prices (Aljazawe, 2006).

Geiger and Ittner (1996) found that government agencies that have legislative requirements for cost accounting data tend to implement elaborate CASs to meet these requirements. However, they do not use cost information for internal use in their organizations, for activities such as managerial decision making. Szychta (2002) found that 100% of her study's respondents stated that the usefulness of accounting systems is to prepare financial statements according to accounting law and for tax purposes; her opinion was supported by Juchau (1986). Furthermore, Szychta (2002) argued that accounting legislation is one of the important factors that influence firms to use CASs;

therefore, if the government implemented accounting legislation, all firms would follow this legislation, especially those that belong to the government sector.

Table 3.2
Summary of the Literature Review

Researchers' names	Research topic	Research objective	Year	Variables (IV)	Variables (DV)
Karmarkar, Lederer, and Zemmerman	Choosing manufacturing production control and cost accounting systems	The aims of this study were to identify the factors that influence firms to choose their control and cost accounting system	1989	Physical characteristics of the manufacturing process (type of production process, production complexity, and number of production) and instability of the production process (relative importance of overheads, extent of competition in the product market)	Production control system Cost accounting system
Bjornenak	Diffusion and accounting: The case of ABC in Norway	To determine the relationship between the diffusion of ABC and some contingent factors	1997	Competition, cost structure, product diversity, and existing costing system	Diffusion of ABC
Mostaque, Gunasekaran, and Erkki	Management accounting systems in Finnish service firms		1998	Competition	
Hill	Adoption of costing systems in US hospitals: An event history analysis 1980–1990	To examine how environmental and organizational factors influenced hospitals to adopt CASs from 1980 to 1990	2000	Size, ownership, location, and occupation rate	Adoption of CASs
Obara and Ukpai	The cost accounting practice in the informal sector in Nigeria	The study's aim was to identify the current practices of cost accounting systems in the informal sector	2001		Cost accounting systems and practices
Szychta	The scope of application of management accounting methods in Polish enterprises	The aims of the study were to present the scope of application of management accounting concepts and methods	2002	Competition, ownership changes in business entities, changes in accounting legislation, and development of the money market	Implementation of management accounting methods
Argilés and Slof	The use of financial accounting information and firm performance: An empirical quantification for farms	To study the relationship between using financial reports in decision making processes and farm performance	2003	Financial reports	Farm performance

Table 3. 2 (Continued)

Researchers' names	Research topic	Research objective	Year	Variables (IV)	Variables (DV)
Dekkera and Smidt	A survey of the adoption and use of target costing in Dutch firms	The objective of this study was to report the adoption and use of costing practices that are similar to the Japanese target costing concept in Dutch manufacturing firms	2003	Competition, uncertain environment, and importance of cost focus	Adoption of target costing
Argilés and Slof	The use of financial accounting information and firm performance: An empirical quantification for farms		2003	Accounting use	Farm performance
McBride	Production costs critical to farming decisions	To study the effect of farm operators on production costs using three dimensions	2003	Operators' age, education, and occupation	Production cost
Roztocki and Schaltz	Adoption and implementation of activity-based costing: A web-based survey	To study the current status of activity-based costing adoption and implementation	2003	Size, business sector	Adoption of activity-based costing
Fullerton and Mcwatters	An empirical examination of cost accounting practices used in an advanced manufacturing environment	To determine whether there is a relationship between adopting sophisticated manufacturing technologies such as JIT, total quality management, and Six Sigma and the use of traditional and non-traditional CASs	2004	Adopting sophisticated manufacturing technologies, JIT, total quality management, Six Sigma	Use of traditional and non-traditional CASs
Emmett and Forget	The utilization of activity-based cost accounting in hospitals	The study aims to investigate the relationship between the practice of activity-based costing and four demographic factors	2005	Size, location, profit status, and membership of chains	Practice of activity-based costing
Emmett and Forget	The utilization of activity-based cost accounting in hospitals	To investigate the relationship between demographic factors and the utilization of ABC in hospitals	2005	Size, status of profit, membership of chains, and location	Utilization of ABC

Table 3. 2 (Continued)

Researchers' Names	Research topic	Research objective	Year	Variables (IV)	Variables (DV)
Ning	The development of cost accounting: A historical perspective	The research aimed to study the factors that influence the development of cost accounting systems in the USA	2005	Production markets, production technology, and cost control	Development of cost accounting systems
Al-Omiri and Drury	A survey of the factors influencing the choice of product costing systems in UK organizations	To examine the influence of contextual factors on the choice of product costing	2007	Product diversity, organization size, cost structure, importance of cost information, competition intensity, business sector, quality of information technology, extent of the use of lean production techniques including JIT, and extent of the use of innovative management accounting techniques	Choice of product costing
Odysseas and Ioannis	Cost accounting in Greek hotel enterprises: An empirical approach	The research aimed to investigate the adoption and the benefits derived from traditional and contemporary management accounting practices in the Greek lodging industry	2007	Cost accounting, budgeting, performance evaluation, decision making, and strategic analysis	Adoption of traditional costing and activity-based costing
Carenys and Sales	Costing the banking services: A management accounting approach	To determine the CASs that are used in the banking sector	2008		
Majid and Sulaiman	Implementation of activity-based costing in Malaysia: A case study of two companies	To explore the difficulties and benefits from practising activity-based costing and to identify the factors that influence firms to adopt activity-based costing	2008		Adoption of activity-based costing
Foong and Teruki	Cost-system functionality and the performance of the Malaysian palm oil industry	To investigate the relationship between the cost system functionality and the performance in oil palm firms	2009	Cost system functionality	Performance

Table 3. 2 (Continued)

Researchers' names	Research topic	Research objective	Year	Variables (IV)	Variables (DV)
Foong and Teruki	Cost-system functionality and the performance of the Malaysian palm oil industry	To investigate the relationship between the cost system functionality and the performance in oil palm firms	2009	Cost system functionality	Performance
Pavlatos and Paggios	A survey of factors influencing the cost system design in hotels	To determine the relationship between the design of CASs in hotels and six contingent factors	2009	Extent of use of cost data, low-cost strategy, level of competition, hotel size, number of services, and membership of a multinational chain	Design of CASs in hotels
Brierley	A comparison of the product costing practices of large and small- to medium-sized enterprises: A survey of British manufacturing firms	To compare the practice of product costing in SMEs and large firms	2011		
Elhamma	The relationship between firm size, activity-based costing, and performance: An application to Moroccan enterprises	To investigate the relationship between the firm size and the practice of ABC, then the relationship between ABC and performance in developing countries	2012	Firm size Practice of ABC	Practice of ABC Performance
Carli and Canavari	Introducing direct costing and activity-based costing in a farm management system: A conceptual model	To identify the information requirements for the development of a DC and ABC in farm management information systems	2013		Application of ABC and direct costing

3.5 Summary

The literature review showed that there are some factors that influence the use of CASs in firms, especially in manufacturing firms and service firms. These factors include the intensity of competition, size, strategy, technology, and uncertainty of the environment. Tahir et al. (2004) argued that technology can also influence the use of cost accounting in agricultural firms. They stated that the development of technology used in agriculture nowadays has led to important modifications in the cost structure and cost behaviour. Therefore, applying modern CASs to allocate overhead costs is necessary because knowing the products' cost is essential for farmers to remain profitable.

The use of CASs is important for all sectors, including the agricultural sector. Argilés and Slof (2003) argued that farmers who use financial reports in decision-making processes will improve their financial performance more than those who do not use these reports in their decision making. Argilés and Slof (2001) also claimed that cost accounting can improve farm management and this will lead to better farm performance.

CHAPTER FOUR
RESEARCH METHODOLOGY

4.1 Introduction

The aim of this chapter is to introduce the methodology used to examine and understand the use of CASs. In particular, Chapter Four discusses the research design (research methods, research questions, research framework, and research hypotheses) and data collection instruments (questionnaire, interview, and documentation analysis). In addition, the measurement of variables, population and sampling, information regarding the data collection processes, and data analysis strategies are discussed.

4.2 Research Design

The available literature suggested that there are two types of research design that can be used to conduct studies, namely cross-sectional studies and longitudinal studies (Sekaran & Bougie, 2013). A cross-sectional study means that the data are collected across the population at one time to provide a snapshot of the targeted population, including the study of the measurement of characteristics, actions, and attitudes of the targeted respondents (Cavana, Delahaye, & Sekaran, 2001). In contrast, a longitudinal research design is used to collect multiple data for every individual for longer periods of time, and it is usually used to measure the changes in one or more characteristics of the population that has been selected for the study, for instance comparing the results of surveys over several years (Cavana et al., 2001). This thesis adopted the cross-sectional design to answer the research questions, because the objectives of this thesis are to examine the relationship between six contingent factors and the use of CASs at a particular point of time, and a cross-sectional study is more appropriate for achieving this objective (Sekaran & Bougie, 2013).

As for the research approach, the researcher used the mixed-method approach to achieve the aim of this thesis. In the social sciences, the mixed-method approach has become increasingly popular, because using two methods will provide the benefits of both methods and overcome the shortcomings of using one method. According to Modell (2005), the use of mixed methods can be traced to 1959, when Campbell and Fiske (1959) used multiple quantitative methods to assess convergent and divergent validity. The study by Campbell and Fiske (1959) mainly collected multiple quantitative data; their study encouraged other researchers to use multiple methods and gather multiple forms of data in one study (Migiro & Magangi, 2011).

Creswell and Clark (2010) claimed that there are many definitions of mixed methods. For instance, Creswell, Clark, Gutmann, Petska, and Hanson (2003, as cited in Hanson, Creswell, Creswell, Clark, & Petska, 2005) defined mixed methods as:

> The collection or analysis of both quantitative and qualitative data in a single study, in which the data are collected concurrently or sequentially, are given priority, and involve the integration of the data at one or more stages in the process of research. (p. 224)

Using both qualitative and quantitative methods together gives reliable and valid results (Perone & Tucker, 2003). Furthermore, the advantages of using both methods make a stronger research design because the inadequacies of individual methods are minimized as more threats to internal validity are realized and addressed (Perone & Tucker, 2003;

Hanson et al., 2005; Williams, 2007; Creswell & Clark, 2010). Besides, using mixed methods allows the researcher to examine the theoretical model and then develop this model based on the information gained from the survey and it is possible to use the results of one method to develop the other method (Hanson et al., 2005). Mixed methods examine the consistency of the results gained from different instruments. Moreover, different methods could be used for different purposes in a single study (Migiro & Magangi, 2011).

There are two main types of mixed methods, which are the sequential design and the concurrent design (Hanson et al., 2005; Creswell, 2006; Harris & Brown, 2010). The sequential design includes three designs, the sequential explanatory design, sequential exploratory design, and sequential transformative design. The sequential explanatory design is used to explain the relationships between variables (Hanson et al., 2005). In this design, quantitative data are collected and analysed in the first place, then qualitative data are collected and analysed in the next stage, during which greater priority is given to quantitative data. The quantitative and qualitative data are connected during the interpretation stage. The sequential design includes the sequential exploratory design, which explores the relationships when the study variables are not known. Here, the priority is given to the qualitative method. The first step in the sequential exploratory design is to collect and analyse the qualitative data, whereas the second step is to collect and analyse the quantitative data. As with the explanatory study, the connection between the two methods is in the interpretation stage. The sequential design also includes the sequential transformative design, which is used to give diverse alternative perspectives and to allow a better understanding of the phenomenon. The priority in this design is sometimes given to the qualitative and other times to the quantitative method.

On the other hand, the concurrent design includes the concurrent triangulation, concurrent nested, and concurrent transformative designs (Hanson et al., 2005). The concurrent design methods collect the data for both methods (qualitative and quantitative) concurrently, while the priority is different in the data analysis. For instance, for concurrent triangulation, the quantitative and qualitative data are usually equally collected and analysed, while in the concurrent nested method, the priority will be placed on one of them. For the transformative design, sometimes the data collection is equal and sometimes it is unequal. Concurrent designs are used to confirm, cross-validate, and corroborate study findings, gain a broader perspective on the topic at hand, or study different groups or levels within a single study.

For this thesis, the researcher used the sequential explanatory design as this type of mixed method allowed the researcher to collect and analyse quantitative data first, then qualitative data (Creswell, 2008). The researcher collected the quantitative data using a questionnaire, whereas the qualitative data were collected using semi-structured interviews and documentation analysis. The priority in this research work was on the quantitative method. The connection between the two methods was made during the interpretation stage. Figure 4.1 depicts the research design followed in this thesis.

Questions 1 and 2 were answered by both methods, question 3 was answered by the questionnaire, and questions 4 and 5 were answered by the semi-structured interviews.

The researcher used the survey to collect the data related to question 3, concerning the factors that influence the use of CASs in Libyan agricultural firms, while the interviews and documents were used to understand how Libyan agricultural firms use CASs. The researcher chose this sequential explanatory design because it can explain the relationship between variables in a particular period of time (Hanson et al., 2005).

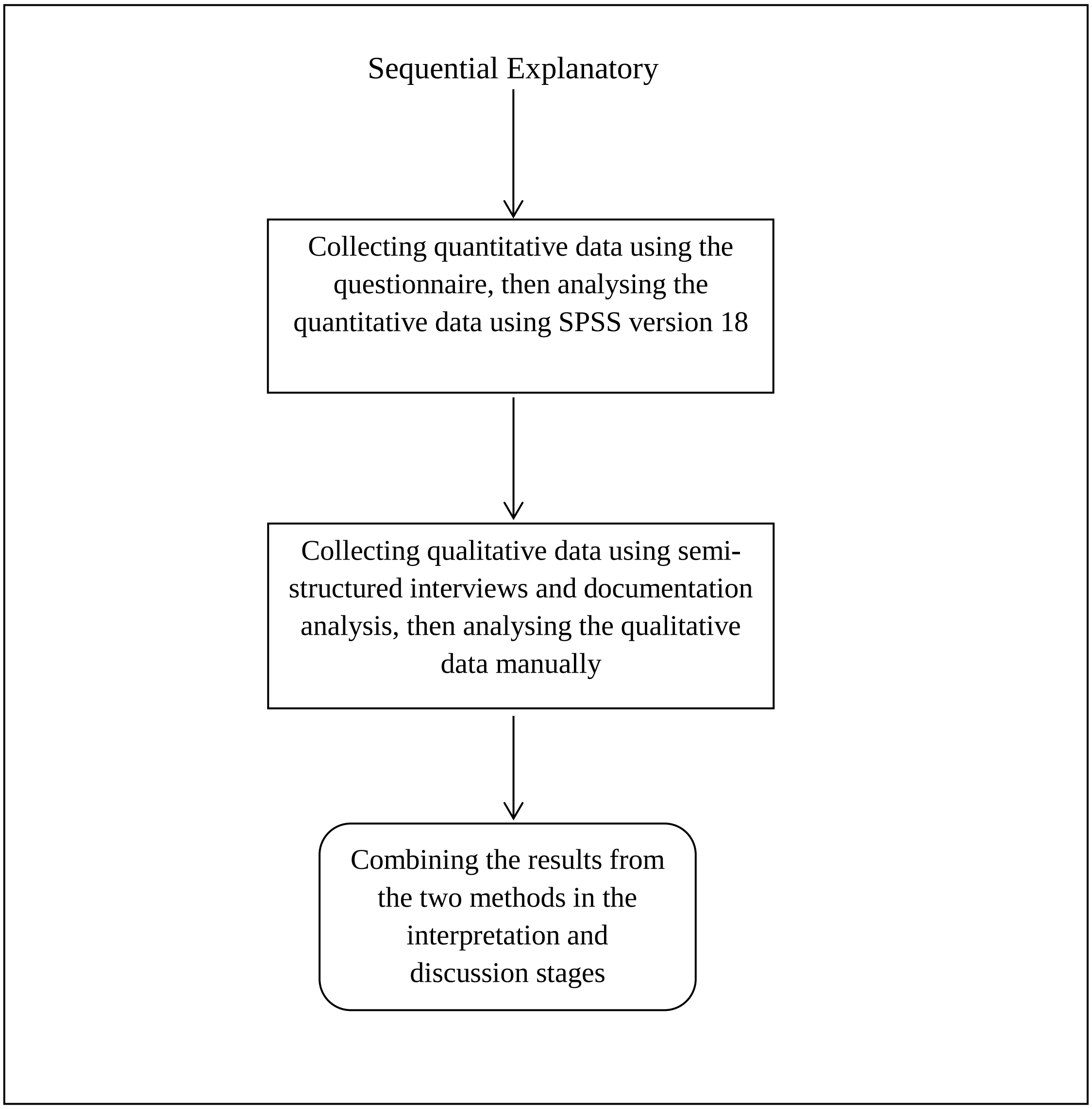

Figure 4.1
Research Design

4.2.1 Research Questions

This thesis aims to achieve one main objective, namely "to understand the use of cost accounting systems in Libyan agricultural firms", and five sub-objectives: (1) to identify whether Libyan agricultural firms use CASs, (2) to identify the extent of use of CASs in Libyan agricultural firms, (3) to examine the factors that influence the use of CASs in Libyan agricultural firms, (4) to identify how Libyan agricultural firms allocate overhead costs, and (5) to identify how Libyan agricultural firms calculate their product costs. To achieve these objectives, the researcher set one general question and five sub-questions as explained below:

The main question in this thesis was: *How do Libyan agricultural firms use CASs?* To answer the main question, the following sub-questions were set. Question one was related to whether Libyan agricultural firms use CASs. After making sure that Libyan agricultural firms do use CASs, the researcher set question two, which related to the extent of use of CASs in Libyan agricultural firms. Interviews, a survey, and documentation analysis were used to obtain answers to the first and second questions.

In the literature review, most of the studies concentrated on the factors that influence the adoption of one of several CASs, such as ABC (Roztocki & Schaltz, 2003; Odysseas & Ioannis, 2007), as well as the factors that influence the design of CASs in manufacturing and service firms (Emmett & Forget, 2005; Pavlatos & Paggios, 2009). However, the researcher could not find any study that focused on the factors that influence the use of CASs in agricultural firms, especially in Libya. To build the research framework in this thesis, it was difficult to select some of the factors that influence the design, choice, and use of cost accounting systems in other sectors in this thesis, which is related to agricultural activities. For instance, Al-Omiri and Drury (2007) studied the factors that influence the choice of product costing in the UK. In their study, Al-Omiri and Drury (2007) focused on nine factors. Agricultural production processes are different from manufacturing processes; therefore, some of the factors in Al-Omiri and Drury's study are more related to manufacturing firms, such as the extent of use of lean production systems and the quality of information technology, and are not appropriate for agricultural firms.

Al Omiri and Drury (2007) studied the influence of the business sector on the choice of product costing. This factor also cannot be used in the current study. Al-Omiri and Drury (2007) included several sectors in their study (manufacturing and service), whereas in this research there is only one sector, which is the agricultural sector. Besides the factors adopted from Al-Omiri and Drury's (2007) study, this thesis examined the influence of legal obligation on the use of CASs; several studies have suggested that firms that belong to the government sector are influenced by legal obligations to use CASs (Argilés & Slof, 2003; Athanasios et al., 2010). The research sample in this thesis belongs to the government sector; consequently, this factor was used in this thesis to examine the influence of legal obligation on the use of CASs in Libyan agricultural firms.

This thesis adapted the factors that can be found and implemented in agricultural firms, specifically contingent factors that influence the use of CASs in the Libyan business environment. This led to the third question of this thesis, which concerns the factors that influence Libyan agricultural firms to use CASs.

Question three was related to the factors that influence the use of CASs in Libyan agricultural firms. It was answered by using the survey method to examine the influence of six independent variables, namely firm size, cost structure, level of competition, product diversity, importance of cost information, and legal obligation, on one dependent variable, which was the use of CASs.

Because this thesis focuses on the use of CASs in Libyan agricultural firms, specific questions concerning how Libyan agricultural firms use CASs were answered using the qualitative method (interviews and documentation analysis). To understand the use of CASs in Libyan agricultural firms, the researcher extracted the following questions: question four related to how agricultural firms in Libya allocate overhead costs to their products and question five asked how agricultural firms in Libya calculate their product costs. The researcher set some questions in a semi-structured interview to answer question four and question five. For instance, as shown in Appendix 2, section 3 was set to answer question four and question five. In fact, section 3 was used to understand how Libyan agricultural firms use CASs.

4.2.2 Research Framework

The third question of this research aimed to examine the factors that influence Libyan agricultural firms to use CASs. This thesis relied on contingency theory to examine the relationship between the contingent factors and the use of CASs. Jackson (2000) claimed that many approaches of contingency theory were developed in the late 1960s. This theory argues that there is no appropriate cost accounting system suitable for all organizations (Pavlatos & Paggios, 2009). Rather, contingency theory assumes that the surrounding circumstances make business organizations use an appropriate CAS that provides the firms with related cost information to assist the decision makers in making the appropriate decision (Haldma & Lääts, 2002). Contingency theory determines specific aspects of the cost accounting system that are connected with certain defined circumstances and demonstrate an appropriate matching (Otley, 1980). Contingency theory has been used by many researchers in management accounting studies to understand the use of CASs. For instance, Haldma and Lääts (2002) depended on contingency theory to identify how contingent factors influence the implementation of management accounting in manufacturing firms. Gong and Tse (2009) claimed that firms will be influenced by internal and external factors in choosing CASs, which means that organizations that work in different environments will be supported by different types of CASs. In this case, it is advisable for management researchers to identify the appropriate cost accounting methods that are suitable for different environments.

Otley (1980) adopted contingency theory to study management accounting practices. Contingency theory looks at specific influential factors that assist the management in choosing an appropriate CAS. Otley (1980) suggested some factors that influence firms to use management accounting systems, including technology, organization structure, and business environment. Contingency studies of CASs have attempted to relate the use of CASs to several contextual variables, which have been widely classified into external and internal variables (Haldma & Lääts, 2002). The accounting literature shows that the most important internal contingent factors that influence the use of CASs are the firm size, production technology, cost structure, and product diversity, whereas the external factors include the intensity of competition (Otley, 1980; Al-Omiri & Drury, 2007; Abdel-Kader & Luther, 2008).

Although there are several contingent factors that might influence the use of CASs in business organizations, those factors cannot be implemented in all cost accounting studies, because the contingent factors that influence manufacturing firms might not influence service or agricultural firms (Emmanuel, Otley, & Merchant, 1990). The contingent factors that influence firms in a specific country might not influence their counterparts in other countries, as suggested by contingency theory (Emmanuel et al., 1990).

This thesis examined the contingent factors related to the Libyan business environment and the circumstances that surround the research sample; most of these factors were adapted from Al-Omiri and Drury's (2007) study, and one factor, namely legal obligation, was suggested by other studies, including Argilés and Slof (2003) and Athanasios et al. (2010), as one of the factors that influence firms in the government sector to use CASs. Specifically, this thesis examined the influence of six contingent factors, which include the agricultural firm's size, cost structure, level of competition, product diversity, importance of cost information, and legal obligation. By reviewing the accounting literature, the researcher found that there is a causal relationship between the six contingent factors and the use of CASs.

Based on the available literature, as discussed in Chapter Three, and feedback from papers presented at conferences, the researcher relied on the following model or research framework:

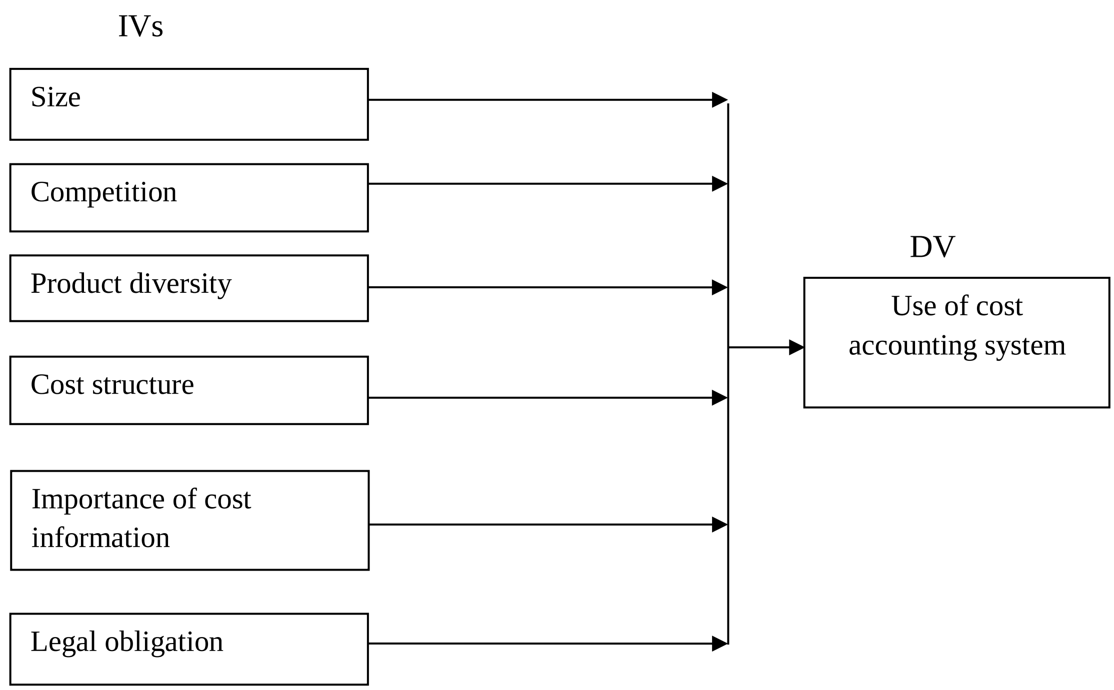

Figure 4.2
Research Framework

4.2.3 Research Hypotheses

4.2.3.1 Size

It is argued that firms' size motivates them to use CASs (Abdel-Kader & Luther, 2008; Pavlatos & Paggios, 2009). Firms' size can be gauged by different measurements; for instance, Abdel-Kader and Luther (2008) measured firms' size based on their total assets and Pavlatos and Paggios (2009) measured firms' size based on the log value for their annual sales turnover. Large firms are likely to have a large amount of resources, use modern production technology, and produce several types of products. The use of CASs in large firms will help them to use their sources more efficiently and allocate costs to products more accurately (Argilés & Slof, 2003). Agricultural firms in Libya are very large: 65.2% of the research sample gain revenues greater than 1 million dinar per year, and 73% of the research sample are located on an area between 100 and 5,000 acres.

Most other researchers have studied size as a factor that influences the use of CASs (Obara & Ukpai, 2001; Roztocki & Schaltz, 2003; Emmett & Forget, 2005; Pavlatos & Paggios, 2009). They claimed that large firms need to use CASs, such as ABC, to allocate the indirect costs to all the products in an appropriate way. Argilés and Slof (2003) concluded that large agricultural firms will produce more products than small ones by using more machines and developed technology. Such agricultural firms apply CASs to allocate those costs. Noltemeyer (1986) claimed that because of their size, firms cannot maintain an adequate profit margin; therefore, implementing CASs will assist firms to overcome this obstacle. The study conducted by Obara and Ukpai (2001) on the use of cost accounting in the informal sector in Nigeria found that small firms do not use CASs. One of the causes was their size. On the other hand, as claimed by Foong and Teruki (2009), agricultural firms' size influences the CASs' functionality. This led to the following hypothesis:

$H_{1:}$ There is a positive relationship between the size of Libyan agricultural firms and the use of CASs.

4.2.3.2 Level of Competition

The level of competition is one of the important factors that lead firms to use CASs (Ning, 2005). Competition refers to firms that produce almost the same products and sell those products in the same market. Firms that work in a monopoly can sell their products at any price they want, and at any quality, whereas firms that work in a competitive environment have to reduce their product costs to be able to set competitive prices. Implementing CASs will assist those firms to reduce their product costs (Szychta, 2002). Agricultural firms in Libya initially monopolized the agricultural sector; however, the situation changed after 2003, when the United Nations cancelled the economic sanctions (IMF, 2006). Many foreign companies invested in Libya, including the agricultural sector (EC, 2009), so the use of innovative CASs is required to set competitive prices, especially as the firms that invested in Libya came from developed countries, including Italy. Mia and Clarke (1999) and Szychta (2002) claimed that the intensity of competition is considered to be one of the factors that influence the use of costing systems. Other researchers have found a positive association between the cost system's sophistication and the level of competition (Al-Omiri & Drury, 2007). The level of competition forces firms to decrease their product costs to be able to survive in the industry, which forces firms to use costing systems to reduce their costs (Tani et al., 1994). This led to the following hypothesis:

$H_{2:}$ There is a positive relationship between the level of competition and the use of CASs in Libyan agricultural firms.

4.2.3.3 Product Diversity

Producing several types of products using the same machines requires the use of CASs to determine every product cost separately (Juchau, 1986), since the products will consume different quantities of the firm's resources (Cooper & Kaplan, 1988). Because most Libyan agricultural firms are multi-product firms, producing different types of products (such as vegetables, fruit, milk, meat, and forage), CASs are required to identify the product cost appropriately and to provide cost information for making managerial decisions. According to numerous researchers, product diversity makes the firm's management decide which type of costing systems to use (Odysseas & Ioannis, 2007). A study conducted by Abernethy et al. (2001) focused on the relationship between product diversity and CAS design. The researchers found a positive relationship between product diversity and the choice of costing system. If the firm has a high level of product diversity, sophisticated costing systems are suitable for this production system. However, if the firm has a low level of product diversity, non-sophisticated costing systems are more appropriate. Juchau (1986) claimed that agricultural firms that have huge amounts of capital and produce many types of products need to use CASs to allocate the resources appropriately and to determine every product cost separately. Therefore, the following hypothesis is suggested:

$H_{3:}$ There is a positive relationship between product diversity and the use of CASs in Libyan agricultural firms.

4.2.3.4 Cost Structure

Libyan agricultural firms produce several types of products: 39.1% of the research sample claimed that they produce mixed products (several types of plants and livestock). Relying on machines in production operations changes the cost structure in the organizations; indirect costs increase while direct costs decrease (Johnson & Kaplan, 1987). Changes in cost structure encourage firms to use CASs and to allocate indirect costs to cost objects in an appropriate way, which will lead to the accurate determination of the product costs. All of the Libyan agricultural firms in the government sector rely on machines, from cultivating the soil to packaging, which means increased indirect costs (H. Bawa, personal communication, 1 January 2012). It is necessary to allocate these indirect costs appropriately to determine the product cost. According to previous researchers, the cost structure plays an important role in the selection of a suitable CAS for a firm (Bjørnenak, 1997). If the direct costs constitute the majority of the product costs, there is no need to use sophisticated CASs, such as ABC. On the other hand, if the indirect costs constitute the majority of the product costs, it is difficult to rely on traditional costing to provide appropriate cost information (Brierley et al., 2001b). Another study, conducted by Bjørnenak (1997) in Norway, found that the cost structure is statistically significantly related to the diffusion of ABC. Bjørnenak (1997) claimed that firms that have a high percentage of indirect costs in their cost structure use ABC more than companies that have a high percentage of direct costs in their cost structure. Therefore, the following hypothesis is suggested:

$H_{4:}$ There is a positive relationship between the cost structure and the use of CASs in Libyan agricultural firms.

4.2.3.5 Importance of Cost Information

The desire to decrease the product costs and use the available resources efficiently will increase the significance of cost information, which in turn will motivate firms to use CASs to offer the cost information needed by the decision makers (Al-Omiri & Drury, 2007). Since the increase in the competition from foreign agricultural firms from Italy and the USA, cost information has become more important than ever before; accounting researchers (Ning, 2005; Alleyne & Weekes-Marshall, 2011) believed that the importance of cost information is one of the factors that motivate firms to use CASs. The need for cost information for cost control, inventory valuation, and managerial decisions encourages firms to use CASs (Edwards & Newell, 1991), especially in competitive environments in which competitors try to introduce their products at lower prices, which is possible by reducing the production costs (Al-Omiri & Drury, 2007). Based on the cost information that is needed, the decision makers will choose the type of CAS. If the production system is simple and most of the total costs are direct costs, it is not worthwhile investing in sophisticated CASs, and traditional costing could provide the cost information needed. If, however, the production system is more developed, traditional costing cannot help, and in this case, ABC is more appropriate (Brierley et al., 2001b). Anderson (1995) argued that the different needs for accurate cost information for decision making, cost reduction, and cost control may affect firms' decision to use specific types of CAS. Therefore, the following hypothesis is suggested:

H_5: There is a positive relationship between the importance of cost information and the use of CASs in Libyan agricultural firms.

4.2.3.6 Legal Obligation

Legal obligations also have an impact on the use of CASs in the government sector. The research sample consisted of the agricultural firms in the government sector; thus, the researcher believes that if the government set laws to decrease the subsidies and force firms to publish financial reports, firms will use CASs to obtain the information needed to prepare financial reports and manage the available resources in an appropriate way (Athanasios et al., 2010). In the literature, most other researchers have claimed that a lack of legal obligation affects the use of CASs in agricultural firms. For instance, Athanasios et al. (2010) claimed that European farmers do not publish financial statements because of a lack of legal obligation. Geiger and Ittner (1996) found that government agencies that have legislative requirements for cost accounting data tend to use elaborate CASs to meet these requirements. However, they do not use cost information for internal use; they use it only for external use. Therefore, the following hypothesis is suggested:

H_6: There is a positive relationship between legal obligations and the use of CASs in Libyan agricultural firms.

4.2.4 Data Collection

In this research, the researcher relied on mixed methods to collect the data, as shown in Figure 4.3. The researcher used a questionnaire, interviews, and documentation analysis to collect the data related to this research. The questionnaire instrument was used to collect quantitative data, specifically to answer question 3, which concerned the factors that influence the use of CASs, and question 1 and question 2, which related to whether

Libyan agricultural firms use CASs and the extent to which they use CASs' information. The questionnaire was distributed to management accountants, because they are responsible for using CASs.

Scapens (2006) suggested that if accounting researchers want to understand the use of CASs, it is advisable to interview managers and management accountants. Interviews were conducted mainly to understand the use of CASs in Libyan agricultural firms, to answer question 4and question 5, and to support the findings from question 1 and question 2 (see Appendix 2 for the semi-structured interview).

The mixed method offers many advantages, such as the enhancement of the validity of the research findings (Modell, 2005), and enables the use of different data collection techniques to investigate the same phenomenon (Modell, 2005). This methodology is most appropriate for evaluations that seek to answer complex questions concerning the quality, implementation, outcome, and impact of one or more programmes and to examine the trends over person, place, and time. The mixed method approach has been applied in social science to reduce the risk of false interpretations, by drawing upon multiple independent sources of information, and to strengthen the conclusions about observations.

The researcher relied on three data collection tools: the questionnaire, interviews, and documentation analysis. Zillin et al. (2006) found that most studies reported in the best six international business journals from 1992 to 2003 conducted a survey questionnaire and personal interviews, as well as studies after 2003 (Cadez & Guilding, 2008; Pavlatos & Paggios, 2009).

Perone and Tucker (2003) claimed that collecting data using several techniques allows researchers to obtain more complete and holistic information and reveals the varied dimensions of a given phenomenon. Depending on the different resources for data collection, it will also decrease the shortcomings and enhance the validity.

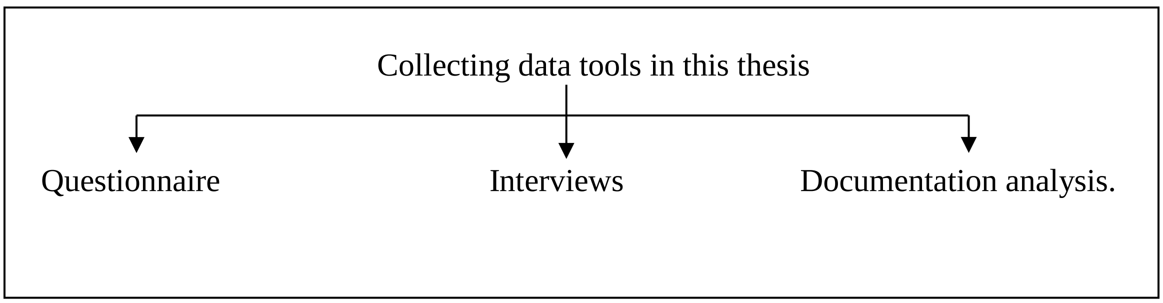

Figure 4.3
Instruments for Data Collection

4.2.4.1 Questionnaire Design

A questionnaire is defined as a method for eliciting, recording, and collecting information (Kirakowski, 2000). Abdel-Kader and Luther (2008) argued that a questionnaire enables researchers to access a large number of targeted participants, which means that information can be collected from a large number of people and the findings can be expressed in numerical terms. Furthermore, Scapens (2006) claimed that to understand management accounting systems, researchers rely on survey questionnaires. Some researchers have argued that questionnaires and interviews are widely used in mixed-method research (Harris & Brown, 2010). In the management literature, Zin (2006) argued that the survey method is more common than other methods, such as the case study method. Harris and Brown (2010) posited that a questionnaire is a more objective research tool that can produce results and the findings can be generalized because of the large sample size.

Researchers can use open-ended or closed-ended questions in the questionnaire. Open-ended questions mean that the respondents can answer the questions in their own words, whereas in closed-ended questions, the respondents must choose one of the answers set in the questionnaire sheet. In this thesis, the researcher used closed-ended questions to restrict the respondents within the set of alternative answers provided to measure their objectives and subjective feeling regarding the factors that influence the use of CASs in Libyan agricultural firms. In addition, there are several ways to distribute questionnaires: by mail, by e-mail, by telephone, or by hand. In this thesis, the researcher distributed and collected the questionnaires by hand because post offices do not offer this service in Libya and most agricultural firms do not have websites. Therefore, the researcher could not use e-mail to send the questionnaire and the most appropriate way to distribute the questionnaire to agricultural firms in Libya was by hand. This method of distributing the questionnaire achieved a response rate of nearly 81%, because the respondents could ask the researcher about any difficult questions.

The researcher adapted most of the measurement items from several studies as follows: background information was adapted from Foong and Teruki's (2009) study, the measurement of size and cost structure was adapted from Al-Omiri and Drury's (2007) study, the measurement of the level of competition was adapted from Al-Omiri and

Drury's (2007) study, the measurement of product diversity was adapted from Baird et al.'s (2004) study, the measurement of the importance of cost information was adapted from Al-Omiri and Drury's (2007) study, the use of CASs was adapted from Geiger and Ittner's (1996) study, and, finally, the measurement of legal obligation was developed by the researcher. Appendix 1 provides the questionnaire in the English language and the translated Arabic language questionnaire.

The researcher used a seven-point Likert scale in the questionnaire. The Likert scale is commonly used to measure attitude by providing a range of responses to given statements or questions, although some literature has argued that the five-point Likert scale has many advantages and benefits. However, the seven-point Likert scale provides detailed feedback and does not subject the respondents to any undue cognitive burden (Hair, Black, Babin, & Anderson, 2010).

In this research, the researcher firstly translated the questionnaire from the English language to the Arabic language, because English is not spoken widely in Libya, whereas Arabic is the official language. To avoid translation mistakes, the researcher followed three steps: first, the questionnaire was translated from English to Arabic, then the researcher sent both copies (Arabic and English) of the questionnaire to two management accountancy experts to review them, in addition to comparing the English and Arabic versions to ensure that the researcher had used the appropriate vocabulary and terms; after receiving the questionnaires sent back by the experts, the researcher incorporated all the comments recommended by the experts. The Arabic copy was amended and sent to experts in the Arabic language to correct the grammar mistakes.

4.2.4.1.1 Reliability

As argued by Yusoff (2010), reliability refers to the extent to which the measurements can measure what they should be measuring. The reliability test is conducted to ensure that the research items consistently reflect the constructs that they are measuring. It assesses the degree to which an instrument gives similar results for the same individuals at different times (Field, 2005). One of the most commonly used statistical tools to test reliability is Cronbach's alpha coefficient. The value of Cronbach's alpha ranges from 0 to 1: higher values refer to greater reliability (Pallant, 2010). In the literature, Cronbach's alpha values of 0.70 and 0.80 have been suggested as appropriate values (Albyati, 2005; Field, 2005). However, some other authors have suggested that a lower value for Cronbach's alpha is acceptable. Hair et al. (1998) argued that 0.60 is considered an acceptable value for Cronbach's alpha. Arikunto (2006, as cited in Karyanto, 2010) classified the value of Cronbach's alpha and the degree of reliability from 0.00 to 0.20 as very low, from 0.21 to 0.40 as low, from 0.41 to 0.60 as fair (can be used), from 0.61 to 0.80 as high, and more than 0.8 as very high.

This thesis conducted a pilot study with a sample of 30 agricultural firms. Based on the pilot data, the researcher calculated the reliability of each of the measurements; in the pilot test, all the values of Cronbach's alpha were more than the minimum value of 0. 5 recommended by the literature (Nunnally, 1978), ranging from 0. 547to 0.912. Table 4.1 shows the values of Cronbach's alpha and the degree of reliability of all the variables:

Table 4.1
Cronbach's Alpha and the Degree of Reliability

Variables	Pilot study
Competition	0.908
Product diversity	0.802
Importance of cost information	0.547
Legal obligation	0.566
Uses of cost information	0.912

4.2.4.1.2 Validity

Validity is the extent to which the measurement measures what it should measure (Yusoff, 2010). In this thesis, the researcher assessed the measurements through two types of validity, namely content validity and construct validity, because these are the two types most commonly used in the literature (Meier, Brudney, & Bohte, 2009).

Content validity is defined as the degree to which elements of an assessment instrument are appropriate and representative of the targeted construct for a particular assessment purpose (Haynes, Richard, & Kubany, 1995). To ensure that the questionnaire collected relevant data that could assist the researcher in achieving this thesis's objectives, a pilot test was conducted with five accountants working in Libyan agricultural firms, who are experts in agricultural accounting, and five academics from Universiti Utara Malaysia and Sebha University. Krejcie and Morgan (1970) claimed that ten experts are sufficient for instrument refinements and verification of the content validity of a research questionnaire. To determine whether the respondents would be able to understand the questions in the questionnaire, the five experts read the questionnaire and reviewed all the questions to ensure the understanding and reliability of the items. The accountants in

Libyan agricultural firms focused on face validity because it relates to their industry uses, whereas the academics focused on content validity. They checked the extent to which each dimension reflects the proposed constructs, the chosen scale points, and whether the questionnaire answer format instructions are suitable.

The feedback from the experts indicated that the questions are easy to understand. However, they found some language mistakes and suggested some modifications related to the questionnaire design. The experts also argued that the seven-point Likert scale is more appropriate for the answers and the statements are clear and easy for the respondents to answer.

Construct validity refers to the extent to which the measurement measures what it should measure (Yusoff, 2010). As argued in the literature, factor analysis is used to test the construct validity. Therefore, the researcher conducted factor analysis to establish the construct validity using the Kaiser–Meyer–Olkin (KMO) test. The researcher also applied Bartlett's test of sphericity to measure the sample adequacy. According to Yusoff (2010), if the KMO value is more than 0.5 and Bartlett's test is significant, the measurements are valid. In this thesis, the KMO values were greater than 0.5, as suggested (Hair, Anderson, Tatham, & Black, 1998): the KMO value for the variable level of competition was 0.721, the KMO value for the variable product diversity was 0.798, the KMO value for the variable importance of cost information was 0.587, the KMO value for the variable legal obligation was 0.580, and the KMO value for the variable uses of cost information was 0.747. Bartlett's tests of sphericity were also highly significant at 0.000 for all the measurements, meaning that the measurements were valid.

4.2.4.2 Interviews

The second tool used for collecting the data was interviews. Oliver (2006) argued that usually a well-prepared interview in the social sciences follows interview protocols. Oliver (2006) studied three interview protocols: the structured, semi-structured, and unstructured protocols. In a structured interview, the interviewer reads prepared questions to the respondents. In this type of interview, the interviewer is not allowed to ask other questions, only the pre-prepared questions. A structured interview is a verbal questionnaire (Oliver, 2006); in an unstructured interview, the interviewer does not have pre-prepared questions.

A semi-structured interview is an interview that is neither highly structured (like a structured interview) nor unstructured. In this type of interview, the interviewees can be asked the same questions, but in a fixable framework, and the respondents are encouraged to talk about their experience through open-ended questions. From their answers, the interviewer determines other questions (Dearnley, 2005). Furthermore, the interview can be conducted face to face or by telephone (Whiting, 2008).

In this thesis, face-to-face semi-structured interviews were the second data collecting tool. The researcher used pre-written questions to guide him during the interviews. Scapens (2006) and Walonick (2010) claimed that personal interviews enable the researcher to obtain in-depth information about a phenomenon. The interviewer asked the interviewees questions from a pre-written questionnaire and then recorded the answers. According to Scapens (2006), researchers interview managers and management accountants to understand the use of CASs. In this thesis, the researcher interviewed cost accountants, financial managers, and production managers to understand the use of CASs in agricultural firms in Libya.

During the distribution of the questionnaires, the researcher asked the management to give him time to conduct an interview with a few relevant employees, because at that time, the Libyan agricultural firms had finished harvesting the winter season crops and had not yet started planting the summer season crops. They told the researcher that they did not mind because they had much free time; therefore, the researcher determined appointments with the targeted persons, who claimed that they have experience in using CASs and that they use cost information for decision making. During the interview, the researcher introduced himself to the interviewees and then explained the purpose of the study to them. Next, the researcher asked them many questions related to the study, including questions about their background, such as their name, qualifications, and number of years in the agricultural firm. The researcher also asked about CAS use; for instance, how they allocate overhead costs in their firms and how they determine product costs.

Appendix 2 presents the pre-prepared interview questions that were used as a guide during the interview. The interview consisted of four sections: the first section was related to information about the interviewees, such as their current position, the second section was concerned with information about the agricultural firms, such as the types of products produced and the firm strategy, the third section was related to information about the CASs, whilst the last section was related to the perspective of the interviewees. The interview questions included several types of questions; some of them were used to support the survey results and others were used to answer questions 1 and 2.

For instance, questions 6 and 7 explained the Libyan agricultural firms' sizes and question 20 was related to identifying their cost structure, whereas question 5 related to determining the number of the products that the firms produce: this question provided the researcher with information about product diversity. Other questions, including questions 22, 23, 24, and 28, were related to the importance of cost information in the Libyan agricultural firms. The rest of the questions were used to ascertain whether the interviewees understand what CASs are; these questions attempted to understand how the Libyan agricultural firms allocate indirect costs, how they treat the inventory, and which depreciation method is used.

The researcher conducted the interviews at different times, including during working hours, breakfast time, lunch time, and after working hours in hostels. Most of the agricultural firms in Libya are located outside cities; therefore, in every agricultural project, there are many hostels for the accommodation of workers. Consequently, after working hours, the participants are in their own hostels and they have sufficient free time to participate in interviews.

4.2.4.3 Documentation Analysis

The third tool for collecting the research data was documentation analysis. To facilitate access to the Libyan agricultural firms, the researcher obtained permission from the University Utara Malaysia (UUM), to protect the rights of individuals participating in research studies and to assess the risk and potential harm of the research to the respondents (Creswell, 2006). With that permission, the researcher could obtain some of the agricultural firms' documents, such as cost statements. Appendix 8 provides a copy of the permission letter issued by the University Utara Malaysia. This letter was translated into the Arabic language since the English language is not widely used by Libyan citizens. Appendix 9 shows the translated permission letter. The researcher utilized this permission to distribute the questionnaire, conduct interviews, and collect documents.

The researcher collected documents from agricultural firms related to CASs, such as cost statements, expense statements, revenue statements, cost statements for wheat production, cost statements for barley production, and cost statements for corn production. The researcher could not collect many documents because of the Libyan situation in 2011 and 2012; when many workers did not come back to their offices due to the war, some documents were burnt and others were stolen. However, with the documents collected, the researcher could support and validate the findings from the questionnaire and interviews. The documents assisted the researcher in identifying the inputs used in the Libyan agricultural firms as well as the conversion processes and outputs; in particular, these documents supported the questionnaire and interviews in answering question 1, which related to whether Libyan agricultural firms use CASs.

4.3 Research Population and Sampling

A research sample is defined as a finite part of a statistical population, the properties of which are studied to gain information about the whole (Webster, 2012). According to Easterby-Smith, Thorpe, and Lowe (2002), when the population is smaller than 500, it is advisable to use all the population (100%) as the research sample, because the population is small and the researchers target the entire population. This kind of sample is called a census sample, and the questionnaire is sent to the entire population. As argued by Viana and Rodrigues (2004), if the research population includes a small number of firms, it is preferable to select all those firms for the survey, and the study should not follow any sampling procedures. In this research, the sample comprised the agricultural firms in Libya, the production firms in the government sector, totalling 57 firms officially registered with the Libyan Government.

The agricultural firms in Libya are divided into two sectors, the government sector and the private sector. The government sector is further divided into two parts, production firms and agricultural settlement firms. The justifications for choosing the production firms are as follows. First, the study selected the production firms in the government sector because of their size. According to Libyan law, private agricultural firms and agricultural settlement firms should occupy 10 acres or less. Furthermore, according to the General People's Committee for Agriculture, Livestock and Marine (2009), only 23.3% of the firms' owners in the private sector rely on farming as their main activity and 77.7% of them have another job. On the other hand, there is no specific number for the area of agricultural production firms in Libya. For instance, the Mknusha agricultural project is 4,189 acres and the Barjuj agricultural project is 3,650 acres in size. Therefore, the researcher could not combine the Libyan agricultural firms in the private and the government sector.

According to Argilés and Slof (2003), large agricultural firms are expected to produce more than small ones. In addition, the overhead costs are higher in large agricultural firms. Furthermore, the owners use advanced technology and better capital, which enable them to implement CASs. Therefore, the researcher selected those agricultural firms because of their size and production. Moreover, this is supported by Juchau (1986), who claimed that multi-product firms need CASs for decision making.

Second, this thesis restricted the population to the production firms in the government sector because those firms are subject to the General People's Committee for Control (Control Ministry, 2011). These firms keep books to explain their expenses and benefits and to prepare financial statements. In addition, mixed agricultural firms are expected to perform better than non-mixed ones (Argilés & Slof, 2003). Therefore, these firms are supposed to use CASs to allocate their overhead costs and to determine their product prices.

Third, small agricultural firms usually do not keep books. With respect to production, most of the farmers in the private sector produce for domestic consumption. This is the case in many countries, such as Turkey (Karakaya, 2009). Therefore, it is not important for them to keep books. The agricultural firms in the government sector produce to achieve food self-sufficiency and to export to other countries; this leads to them producing their products at competitive prices, encouraging them to implement CASs.

Fourth, small and medium-sized agricultural firms are not included in this thesis due to the findings of other studies, such as Isa et al. (2007), who claimed that SMEs use management and financial reports in a limited way. Therefore, it is not worthwhile combining large firms that use CASs and cost information in decision making with small and medium-sized firms that do not rely on cost information in one study, because the findings from the large firms will contradict the results from the small firms.

In short, this research's sample comprised all the government production firms in Libya, consisting of 57 agricultural firms. To understand the use of CASs in these firms, the researcher sent the questionnaire to their management accountants. Therefore, 57 questionnaires were distributed. Then, the researcher interviewed six employees from six different agricultural firms to understand how they use CASs in their firms and what benefits they gain from using CASs. The six interviewees were selected because they have long experience in CASs and decision making in the Libyan agricultural firms and they are in the position to provide the information required for this thesis (Cavana et al., 2001); in addition, due to their willingness to participate, the researcher faced no difficulties in interviewing them. They also provided adequate information to understand the use of CASs.

4.4 Measurement of the Variables

4.4.1 Independent Variables

4.4.1.1 Size

The researcher used objective measurement to measure the size and cost structure. Size was measured using measurements derived from Al-Omiri and Drury's (2007) study, using company annual sales revenues. The revenue was categorized into three categories: small (between 100,000 and 900,000 Libyan dinars), medium (between 1 million and 900,000 million Libyan dinars), and large (greater than 10 million Libyan dinars). A one-way Anova statistical test was conducted to determine which one of these categories has more influence on the use of CASs, as suggested by Pallant (2010).

4.4.1.2 Cost Structure

Cost structure refers to the percentage of direct costs and indirect costs in the total cost. The cost structure was measured with the measurement used by Al-Omiri and Drury (2007). They measured the cost structure using the percentage of indirect and direct costs in the total costs. The respondents were asked to determine the percentage of costs that can be traced directly to the products and the costs that can be indirectly traced to the products. The cost structure was classified into five categories: the balanced category, 50% direct costs and 50% indirect costs, and unbalanced categories consisting of 60% direct costs and 40% indirect costs, 70% direct costs and 30% indirect costs, 80% direct costs and 20% indirect costs, and 90% direct costs and 10% indirect costs. To determine which one of these categories has more influence on the use of CASs, a one-way Anova test was conducted (Pallant, 2010).

4.4.1.3 Level of Competition

Competition means that there are several firms producing almost the same products, which will force the firms to decrease their product costs if they want to sell their products in national and international markets. The researcher relied on Al-Omiri and Drury’s (2007) study to measure the level of competition. They used four items on a seven-point Likert scale, anchored at 1 "strongly disagree" and 7 "strongly agree". The respondents were asked to indicate the price competition that their company was facing. Table 4.2 shows the competition measurement items.

Table 4.2
Level of Competition Measurement Items

Variable	Items	Source
The level of competition	This business unit faces intense competition from outside companies for business. Over approximately the past 10 years the level of competition for our products has significantly increased. The price competition within agricultural firms is extremely intense. The level of competition in the market for the major products of our business unit is extremely intense.	Al-Omiri and Drury (2007)

4.4.1.4 Product Diversity

Product diversity refers to the firms that produce different types of products, using different processes, which consume the firm resources in different proportions. To measure product diversity, the researcher relied on a study conducted by Baird et al. (2004), using a seven-point Likert scale anchored at 1 "strongly disagree" and 7 "strongly agree". Each item was presented as a statement and the respondents were required to indicate the extent to which they agreed with each statement. Table 4.3 presents the product diversity measurement items.

Table 4.3
Product Diversity Measurement Items

Variable	Items	Source
Product diversity	The product fields are quite diverse. Most products require different processes to plant, produce, and distribute. There are major differences in volume/output across product fields. The consumption of support department (e.g., engineering, purchasing, marketing) resources varies quite substantially across production fields.	Baird, Harrison, and Reeve (2004)

4.4.1.5 Importance of Cost Information

This variable refers to the significance of cost information in using CASs, which means that Libyan agricultural firms rely on cost information in managing the firms and making managerial decisions. Four items on a seven-point Likert scale were adapted from Al-Omiri and Drury's (2007) study to measure the importance of cost information. Table 4.4 shows the items used to measure this variable. The respondents were asked to choose one of the seven points used to measure every item, "strongly disagree", "disagree", "disagree somewhat", "neutral", "agree", "agree somewhat", and "strongly agree".

Table 4.4
Importance of Cost Information Measurement Items

Variable	Items	Source
Importance of cost information	The cost of products must be highly reliable to compete in our markets.	Al-Omiri and Drury (2007)
	Cost data are extremely important because of our cost reduction efforts.	
	Cost information is the most important factor when making product and service pricing decisions.	
	The business unit performs many special studies relating to product/service introduction, discontinuation, redesign, mix, or cost reduction decisions.	

4.4.1.6 Legal Obligation

Legal obligation refers to the influence of the governmental laws and regulations on the use of CASs in Libyan agricultural firms. Table 4.5 below shows the items used to measure the legal obligation variable. This item was developed by the researcher to measure legal obligation. The researcher used four items on a seven-point Likert scale. The respondents were asked to state whether the Libyan Government connects the firm performance and the government subsidy, whether the firm has to publish financial reports, whether the income tax affects the firm's preparation of financial statements, and whether the firm is subject to the Libyan Control Ministry.

Table 4.5
Legal Obligation Measurement Items

Variable	Items	Source
Legal obligation	The Government connects the performance and the subsidy that the firm receives from the Government.	Developed by the researcher
	The firm must publish its financial reports.	
	Income tax is one of the factors that make the firm prepare financial statements.	
	The firm is subject to the Control Ministry, which makes it organize its accounts and prepare financial statements.	

4.4.2 Dependent Variable

The dependent variable is the use of CASs, which refers to the purpose of having CASs in Libyan agricultural firms, the extent to which CASs are used in Libyan agricultural firms, traditional costing or ABC, and the benefits of using CASs. This thesis relied on the mean of nine items to examine the relationship between the independent variables and the use of CASs in agricultural firms. The researcher measured this variable by identifying the purpose for which the agricultural firms use cost accounting information. Furthermore, the researcher set nine purposes of cost accounting data, including performance measurement, budget formulation, budget execution, inventory valuation, the preparation of private reports, the determination of selling prices, and management activities. Table 4.6 shows the nine reasons for having CASs, which were adapted from Geiger and Ittner (1996).

Table 4.6

Uses of Cost Information Measurement Items

Variable	Items	Source
Uses of cost information	The cost accounting information is used for price decisions.	Geiger and Ittner (1996)
	The cost accounting information is used for plant or purchase decisions.	
	The cost accounting information is used for managing the firm's activities.	
	The cost accounting information is used for formulating the firm's budget.	
	The cost accounting information is used for executing the firm's budget.	
	The cost accounting information is used for evaluating the firm's inventory.	
	The cost accounting information is used for determining the firm's product prices.	
	The cost accounting information is used for measuring the firm's performance.	
	The cost accounting information in the firm is used for preparing private reports.	

Table 4.7

Definition of the Variables and Measurements

Variables	Definitions	Measurements
Size	Size refers to the agricultural firms' area and the total revenue that the firms obtained during the year.	Objective measurement
Cost structure	Cost structure refers to the percentage of direct and indirect costs in the total cost.	Objective measurement
Level of competition	Level of competition refers to the number of firms that produce almost the same products, aiming to sell these products in the same market.	Seven-point Likert scale
Product diversity	Product diversity refers to the firms that produce several types of products, using different production processes and consuming the firms' resources in different proportions.	Seven-point Likert scale
Importance of cost information	The importance of cost information refers to the significance of cost information in using CASs.	Seven-point Likert scale
Legal obligations	Legal obligation refers to the laws and regulations set by the Government; these regulations encourage firms to use CASs.	Seven-point Likert scale
Use of CASs	Use of CASs refers to the way in which the Libyan agricultural firms trace and allocate direct and indirect costs to the products and determine the product cost, as well as the uses of cost information.	Seven-point Likert scale

4.5 Data Analysis

The study used three instruments to collect the data. The data collected were analysed separately. The survey data were analysed using SPSS version 18, whereas the interview data were analysed using content analysis.

4.5.1 Questionnaire Analysis

To analyse the quantitative data, the researcher used several statistical tools from version 18 of the SPSS software. The statistical tests included factor analysis, reliability analysis to test the goodness-of-measures, non-response bias, missing data, assessing normality, checking for outliers, descriptive statistics to describe the characteristics of the respondents, correlation analysis to describe the relationships between the independent variables (IVs) and the dependent variable (DV), and multi-regression analysis to test the influence of the IVs on the DV. The statistical tools used to analyse the data are clarified below.

Descriptive analysis was conducted to understand the profile of the respondents, such as the frequency, percentage, mean, and standard deviation. The descriptive statistics include descriptive analysis of the categorical data, which include the characteristics of the respondents, such as the gender, experience, level of education, and firm activity. In addition, the descriptive analysis of the continuous data included firms' description, for instance, their revenue. The descriptive analysis provided a description of all the responses that were collected and detected any errors in the data entry process. The mean and standard deviation were used to identify the central tendency and variance of the mean.

The researcher conducted factor analysis to test the measurements' validity. Hair et al. (2010) defined factor analysis as "an interdependent technique whose primary purpose is to define the underlying structure among the variables in the analysis" (p. 93). Factor analysis, as a statistical tool, was developed and used by Charles Spearman to study unobservable hypothetically existing variables (Raykov & Marcoulides, 2006). Multivariate techniques by their very nature will increase the number of variables to ten, a hundred, or sometimes a thousand variables, and they are completely different from univariate techniques, which have only one variable (Hair et al., 2010). Therefore, factor analysis is used to analyse the structure of the interrelationships between a large number of variables and decrease them into sets of variables that are highly interrelated. These variables are known as factors. However, every group of factors is highly interrelated, and these factors are supposed to represent dimensions among the data.

The available literature mentions two types of factor analysis, namely exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Pallant, 2010). Researchers conduct EFA when the topic under study is related to determining how many latent factors are needed to explain the relationships between groups of observed measures. On the other hand, CFA is used when the researchers want to test the existing structures of the relationships between measures. CFA is concerned with confirming and examining the available factor structures, whereas EFA is concerned with discovering a factor structure (Hair et al., 2010).

In addition, if researchers have preconceived ideas about the actual structure of the data based on previous studies, they will know which variables should be grouped together as one factor; in this case, the literature suggested the use of CFA (Hair et al., 2010; Pallant, 2010). This thesis relied on CFA, because it examined the factors that influence the use of CASs in Libyan agricultural firms, and most of the factors and their dimensions are adapted from prior studies.

The researcher conducted correlation analysis to describe the direction and the relationships between the variables. Precisely, the Pearson correlation coefficient was computed to understand the relationships between the two main variables: the IVs, which included firms' size, cost structure, level of competition, product diversity, importance of cost information, and legal obligation, and the DV, the use of CASs.

The Pearson correlation coefficient (r) takes values between -1 and +1. If the variable has a Pearson coefficient value of 1 or -1, it indicates that the variable has perfect correlation, which means that the value of one variable can be determined exactly if the researchers know the value of the other variable. If the variable has a value of +1, it indicates a perfect positive relationship, if the variable has a value of -1, it indicates a perfect negative relationship, and if the variable has a value of 0, it implies no relationship at all. The sign (- or +) refers to the direction of the relationship. A positive sign (+) indicates that if one variable increases, the other variable will increase too. A negative sign (-) infers that if one variable increases, the other one decreases (Pallant, 2010).

The strength of the relationships between the variables is subject to the value of their correlation coefficient (r). According to Cohen (1988), if the value of the Pearson correlation coefficient is between 0.10 and 0.29, the correlation is considered small, if the Pearson correlation coefficient is between 0.30 and 0.49, the correlation is considered medium, and if the Pearson correlation coefficient is between 0.50 and 1.0, it is considered large.

This thesis relied on multiple regressions to examine the relationships between the various determinants (IVs) and the use of CASs (DV). Multiple regressions are a group of statistical techniques that can be used to explore the relationship between a number of IVs and a DV. They tell the researchers how much of the variance in the DV can be explained by the IVs, and they give an indication of the relative contribution of each IV. In addition, multiple regressions allow the researchers to determine the statistical significance of the results for the model and the individual IVs (Pallant, 2010). However, before running multiple regressions, there are some assumptions that should be checked, including reliability, multicollinearity, outliers, normality, and linearity.

The size and cost structure were measured by objective measurements including several groups (the size measurement consisted of three groups and the cost structure measurement consisted of five groups). A one-way Anova (post-hoc test) was conducted to identify which group considered the use of CASs to be more important to their firms. According to Coakes and Ong (2011), two assumptions must be met to conduct a one-way Anova (post-hoc test): the normality in the data and the homogeneity assumption has not been violated, which means that Levene's test of homogeneity of variance is not significant at $P > 0.05$.

4.5.2 Interview Data Analysis and Documentation Analysis

Qualitative data consist of words, sentences, and observations. They do not include numbers, like quantitative data. According to Renner (2003), qualitative data can be collected in several ways, such as interviews, open-ended questions, discussion groups, and case studies. The qualitative method of the study was designed to explain and understand the use of CASs in Libyan agricultural firms and to explain the phenomenon in a way that was not in line with the quantitative method results. In this thesis, the qualitative data came from semi-structured interviews. Analysing qualitative data can be undertaken manually or by using software. This thesis analysed the qualitative data manually, because the researcher interviewed only six persons and this number is quite small to use software. To analyse the qualitative data collected using personal interviews and documentation analysis, the researcher relied on descriptive analysis (Glaser, 1965). The researcher followed the five steps discussed below (suggested by Taylor-Powell & Renner, 2003) to analyse the qualitative data.

The first step involved understanding or knowing the data: to achieve this point, the researcher read the data several times to gain a very good understanding of the data and write the ideas related to the research questions.

The second step consisted of determining the questions that the researcher wants to answer from these data or what the researcher wants to find out from this information. In this thesis, the researcher wanted to understand the use of CASs; therefore, the interviews were used to ascertain whether Libyan agricultural firms use CASs, the extent to which they use CASs, how they allocate their overhead costs, and how they determine their product costs.

The third was categorizing the information: some researchers refer to categorizing the data as coding the data; however, in the qualitative approach, categorizing the data does not include numerical codes as in quantitative analysis. The categorization of the data can be undertaken in several ways, for instance using questions or cases. In this thesis, the data were categorized according to the interview questions.

The fourth stage involved identifying the patterns and connections within and between categories: in this thesis, the qualitative data were categorized according to the questions, for instance how the firm determines the product cost was categorized as product costing and which costing method is used to evaluate the inventory was categorized as inventory valuation. In the fourth step, the researcher connected the interviewees' answers in one table to facilitate the comparison between them.

The fifth stage was interpretation: in this final step, the researcher interpreted the data to answer the targeted questions or to achieve the research objectives (Hanson et al., 2005). In this step, the researcher compared the interviewees' answers to find the similarities and differences between the responses.

4.6 Summary

This chapter discussed the method that this thesis used to collect and analyse the data. The thesis set five questions to achieve its objectives, some of which had to be answered by a questionnaire survey, while others were answered by interviews. From the six mixed-method designs, the concurrent triangulation design was used in this research. The questionnaire method was used to answer the third question, while the first two questions were answered using both methods, and last two questions were answered from the interviews.

The questionnaire survey was mainly used to collect data concerning the factors that influence Libyan agricultural firms to use CASs, namely the firms' size, level of competition, product diversity, cost structure, importance of cost information, and legal obligation. The respondents targeted for the questionnaire were management accountants. The majority of the questionnaire items and measurements were adapted from previous studies. Only one variable measurement was developed by the researcher.

Interviews and documents were used to assist the researcher in understanding the current use of CASs in Libyan agricultural firms and to explain the phenomenon in a way that was not in line with the quantitative method results. Semi-structured interviews and documents were used to collect the data for understanding the use of CASs. Due to their experience in practising cost and management accounting, their responsibility for making several managerial decisions, and their willingness to be interviewed, six interviews were conducted with financial and management accountants and production managers.

Finally, the data collected using the questionnaire were analysed using SPSS version 18. Several statistical tests, such as descriptive analysis, were conducted to identify the respondents' profiles and the sample characteristics. Correlation analysis was used to determine the correlation between the IVs and the DV. Factor analysis was used to analyse the structure of the interrelationships between huge numbers of variables and decrease them into sets of variables that are highly interrelated. Finally, multiple regression analysis was conducted to explore the relationship between the number of IVs and the DV and to determine the statistical significance of the results for the model and the individual IVs. In relation to the qualitative data, they were analysed manually.

CHAPTER FIVE
RESEARCH FINDINGS

5.1 Introduction

This chapter presents the research findings and is divided into two main sections. The first section presents the findings gathered from the questionnaire to answer the following questions: 1) Do agricultural firms use cost accounting systems? 2) To what extent do agricultural firms use cost accounting systems? 3) What are the factors that influence the use of cost accounting systems in Libyan agricultural firms? The questionnaires were analysed using SPSS version 18. The second section presents the interview data analysis to answer the following questions: 1) Do the agricultural firms use cost accounting systems? 2) To what extent do the agricultural firms use cost accounting systems? 4) How do agricultural firms in Libya allocate overhead costs to their products? 5) How do agricultural firms in Libya calculate their product costs? The interview data were analysed manually, following the steps suggested by Renner (2003).

5.2 Analysis of the Survey Responses

5.2.1 Response Rate

In the literature, response rates differ from one study to another, depending on the method of distributing the questionnaire, such as by e-mail, hand, or mail. According to Zillin et al. (2006), survey questionnaires have the highest response rate; studies using administered questionnaire surveys have the highest response rate of 51.2%, then telephone interviews with 45.2%, followed by personal interviews with 36.6%. In this thesis, the questionnaire was distributed by hand to 57management accountants in 57 Libyan agricultural firms and 46 questionnaires were returned. Therefore, the response rate was almost 81%, while the non-response rate was 19% (11). In a study conducted by Abdel-al and McLellan (2011) in a developing country, namely Egypt, on management accounting uses, the study's response rate was 79%, almost the same as the response rate of this thesis. The response rate is quite high in both studies and this might be because in both studies the researchers distributed and collected the questionnaires by hand.

The early response rate was 76% (35), while the late response rate was 24% (11). The response rate appears to be quite high, perhaps because of a lack of research in agricultural firms, as mentioned by H. Bawa (personal communication, 1 January 2012), who claimed that agricultural firms in Libya face many accounting problems.

5.2.2 Test of Non-Response Bias

Non-respondents sometimes differ from respondents in behaviour, attitudes, personalities, demographics, motivations, and psychographics, any or all of which may influence the findings of the study. Bias is the difference between a survey's estimate and the actual population value. In a sample survey, it can be considered to be the expected value of this difference based on all possible samples (Bose, 2001). To calculate the non-response bias for continuous data using SPSS, the mean must be calculated first. Calculating the mean enables the researcher to calculate the non-response bias. In this thesis, the researcher divided the respondents into two groups: early respondents who returned the questionnaire within three weeks after distribution and late respondents who returned the questionnaire after three weeks. A total of 35 questionnaires were returned during the first three weeks, while 11 were returned after three weeks from the distribution of the questionnaire.

Using the SPSS software, the researcher conducted a descriptive test and Levene’s test for equality of variance on the demographic and continuous data. The researcher conducted a descriptive test to compare the mean, standard deviation, and standard error mean between the early and the late respondents, as shown in Appendix 3 (group statistics). The results from the descriptive test indicated that there were no significant statistical differences in the demographic variables. In addition, the results from Levene’s test of equality of variance indicated that there were no significant differences in continuous variables, as shown in Appendix 3 (Levene’s test for equality of variance). The group statistics tables provide the number of the respondents (N), mean, and standard deviation for each group, including the categorical variables and continuous variables. Both tables gave the researcher the number of respondents in each group (N). The researcher checked these values to determine whether the values were correct or not. If (N) showed that there were missing values, the researcher found out the reason for these missing data, for instance mistakes in the entering processes.

As indicated by Pallant (2010), if the significance value for Levene’s test is greater than 0.05, it means that the variances for the two groups are the same and the researcher should use the first line (equal variances assumed), whereas, if the significance value for Levene’s test is equal to or less than 0.05, this means that the variances for the two groups are not the same; in this case, the researcher should use (equal variances not assumed), which means that the data violate the assumption of equal variance. In this thesis, the significance level for Levene's test was greater than 0.05, which means that the assumption of equal variances has not been violated. Therefore, the researcher used the first line to report the t-value.

In this thesis, all the significance values were greater than 0.05; therefore, the researcher used the first line to ascertain whether there was a significant difference between the two groups, relying on the column named sig. (2-tailed) values. If the value of the sig. (2-tailed) is less than or equal to 0.05, there is a significant difference in the mean scores on the DV for each of the two groups. On the other hand, if the value of the sig. (2-tailed) is greater than 0.05, there is no significant difference in the mean scores on the DV for each of the two groups. In this thesis, the values of sig. (2-tailed) ranged from .157 to .967 for continuous data (see Appendix 3). All the values were above .05; therefore, there was no statistical difference in the mean scores for all the variables.

5.3 Descriptive Analysis

5.3.1 Profile of the Respondents

Table 5.1

Profile of the Respondents (N = 46)

Demographic variable	Categories	Frequencies	Percentage %
Gender	Male	37	80.4%
	Female	9	19.6%
Experience	Less than 5 years	17	37%
	5 to 10 years	12	26.1%
	10 to 20 years	9	19.6%
	More than 20 years	8	17.4%

Table 5.1 (Continued)

Demographic variable	Categories	Frequencies	Percentage %
Level of education	Diploma	7	15.2%
	High diploma	11	23.9%
	Degree	26	56.5%
	Master or PhD	1	2.2%
	Others	1	2.2%
Qualification	Accounting	28	60.9%
	Management	3	6.5%
	Others	15	32.6%
Working years in the firm	Less than 5 years	13	28.3%
	5 to 10 years	5	10.9%
	More than 10 years	28	60.9%
Area (acres)	Less than 100	5	10.9%
	100 to 5,000	35	76.1%
	5,001 to 10,000	4	8.7%
	10,001 to 25,000	1	2.2%
	25,001 to 50,000	1	2.2%
Activity type	Field crops	17	37%
	Permanent crops	2	4.3%
	Granivore	9	19.6%
	Mixed products	18	39.1%
Number of employees	Less than 100	22	47.8%
	101 to 500	21	45.7%
	501 to 1,000	1	2.2%
	1,001 to 2,500	2	4.3%
Cost accounting systems	Traditional costing	24	52.2%
	Activity-based costing	15	32.6%
	Not specific	7	15.2%

5.3.1.1 Gender

The gender of the respondents was identified by looking at their answer to the question about gender in the questionnaire; the researcher used numbers to simplify the descriptive analysis – number 1 was used to refer to males, while number 2 referred to females. In Table 5.1, the respondents were classified into 37 males (80.4%) and 9 females (19.6%). This percentage is normal because most agricultural firms are located far away from cities and Libyan society is a conservative society, which does not allow females to work far away from their homes.

5.3.1.2 Experience

The respondents' experience was measured by looking at their answers to the questions about experience, which had to be answered on the questionnaire sheet. To make this question simpler for the respondents to answer, the researcher divided the experience into several periods, represented by number 1 for respondents who had experience of less than 5 years, number 2 for respondents who had experience of between 5 and 10 years, number 3 for respondents who had experience of between 10 and 20 years, and number 4 for respondents who had experience of more than 20 years. Table 5.1 shows the respondents' experience.

Table 5. 1shows that 17 (37%) respondents have experience of less than 5 years, followed by 12 (26.1%) respondents who have experience of between 5 and 10 years, then 9 (19.6%) who have experience of between 10 and 20 years. A total of 8 respondents (17.4%) have experience of more than 20 years.

5.3.1.3 Level of Education

To measure the level of education, the researcher asked the respondents to report their level of education in five groups: diploma, high diploma, degree, master's or PhD, and others. For the descriptive analysis, the researcher gave every level of education a number: diploma: number 1, high diploma: number 2, degree: number 3, master's and PhD: number 4, and finally other levels of education: number 5. Table 5. 1shows the participants' level of education. Most of the respondents (26, 56.5%) have a degree, whereas 11 (23.9%) of the respondents have a high diploma and 7 (15.2%) have a diploma, while just 1 (2.2%) has a master's or PhD degree and 1 (2.2%) has other certification.

5.3.1.4 Qualifications

Qualifications were measured by looking at the respondents' answers regarding the field of knowledge that they studied. For analysis purposes, the researcher gave every specialization a specific number: number 1 was for accounting, number 2 for economics, number 3 for finance, number 4 for management, and number 5 for respondents who have other specializations. Table 5. 1indicates that most of the respondents (28 or 60.9%) have certification in the accounting field. The respondents whose qualification is not in accounting, economics, finance, and management are in second place (15 respondents or 32.6%). In the third rank are the respondents who have certification in the management field (3 or 6.5%), and none of the respondents have certification in finance or economics.

5.3.1.5 Working Years in the Firm

Since the respondents have worked in several agricultural firms, the researcher asked them how long they have been working in their current firm. Therefore, the working years in the firm were divided into three groups: less than 5 years was assigned the number 1, between 5 and 10 years was assigned the number 2, and more than 10 years was assigned the number 3. As shown in Table 5.1, 28 (60.9%) of the respondents have been working in this agricultural firm for more than 10 years, while nearly half of them (13, 28.3%) have been working in this agricultural firm for a period of less than 5 years, and 5 (10.9%) have been working in this agricultural firm for between 5 and 10 years.

5.3.1.6 Activity Type

Table 5. 1indicates that 18 (39.1%) of the respondents stated that their firms produce mixed products, and 17 (37%) of the respondents mentioned that they work in agricultural firms that produce field crops (barley and wheat), then 9 (19.6%) of the respondents stated that their firms work in granivore activities, while only 2 (4.3%) of the respondents stated that they work in agricultural firms that produce permanent crops.

5.3.1.7 Area

Table 5. 1shows that the majority of the respondents (35, 76.1%) claimed that their firm area is between 100 and 5,000 acres, while 5 (10.9%) mentioned that they work in agricultural firms where the area is less than 100 acres. In the third rank, 4 (8.7%) respondents stated that their firm size is between 5,001 and 10,000 acres, while the same number of respondents – 1 (2.2%) – stated that their firms' area is between 10,001 and 25,000 and between 25,001 and 50,000 acres.

5.3.1.8 Number of Employees

Table 5. 1shows the number of employees of each agricultural firm. As shown in Table 5.1, 22 (47.8%) respondents mentioned that they work in agricultural firms that have fewer than 100 employees, and 21 (45.7%) respondents stated that they work in agricultural firms that have between 101 and 500 employees. Two respondents (4.3%) stated that they work in agricultural firms that have more than 1,001 and fewer than 2,500 employees. Only 1 (2.2%) respondent stated that he works in an agricultural firm that has between 501 and 1,000 workers,

5.3.1.9 Cost Accounting Systems

Table 5. 1indicates that 24 (52.2%) respondents stated that they use traditional costing in their firm, while 15 (32.6%) respondents reported that they use ABC. In addition, seven (15.2%) respondents did not specify which CAS they used, traditional costing or ABC.

5.3.2 Descriptive Statistics for Continuous Variables

The revenue of each agricultural firm was measured by looking at the respondents' answers to the question in the questionnaire about their organization's annual gross revenue. Using the SPSS software, the researcher divided the answers into three groups and every category was assigned a number: number 1 was given to the firms with revenue between 100,000 and 900,000, classified as small, number 2 was given to firms with revenue between 1,000,000 and 9,900,000, classified as medium, while number 3 was given to firms with revenue of more than 10,000,000, classified as large. Table 5.2 shows that 31 (67.4%) respondents indicated that the revenue of their firm is between 1,000,000 and 9,900,000, while 14 (30.4%) stated that their firm's revenue is between

100,000 and 900,000; however, just 1 (2.2%) respondent stated that the firm's revenue is more than 10,000,000. The mean was 1.72 and the standard deviation was .502.

Table 5. 2
Agricultural Firms' Revenues

		Frequency	**Percentage**	**Mean**	**Std Deviation**
Valid	between 100,000 and 900,000	14	30.4%	1.72	.502
	between 1,000,000 and 9,900,000	31	67.4%		
	more than 10,000,000	1	2.2%		
	Total	46	100.0%		

From Table 5.3 below, it can be seen that 20 (43.5%) respondents mentioned that 70% of the total costs are direct costs, then 13 (28.3%) respondents stated that 80% of the total costs are direct costs, followed by 7 (15.2%) respondents who stated that 50% of the total costs are direct costs while the other 50% are indirect costs, then 3 (6.5%) respondents stated that 60% of their costs are direct costs, whereas 3 respondents (6.5%) stated that 90% of their costs are direct costs. The mean for the cost structure was 3.03 with a standard deviation of 1.127.

Table 5. 3
Cost Structure

		Frequency	Percentage	Mean	Std deviation
Valid	50% indirect costs and 50% direct costs	7	15.2%	3.03	1.127
	60% indirect costs and 40% direct costs	3	6.5%		
	70% indirect costs and 30% direct costs	20	43.5%		
	80% indirect costs and 20% direct costs	13	28.3%		
	90% indirect costs and 10% direct costs	3	6.5%		
	Total	46	100.0		

Tables 5.4, 5.5, 5.6, 5.7, and 5.8 describe the competition, product diversity, importance of cost information, legal obligation, and uses of cost information. The 46 respondents' answers ranged from 1 to 7, with a mean between 3.87 and 5.85 and a standard deviation ranging from 1.135 to 2.147.

Table 5.4
Level of Competition

	N	Minimum	Maximum	Mean	Std Deviation
Level of competition 1	46	1	7	4.52	2.147
Level of competition 2	46	1	7	4.20	1.939
Level of competition 3	46	1	7	4.30	1.896
Level of competition 4	46	1	7	4.48	1.963
N	46				

Table 5.5
Product Diversity

	N	Minimum	Maximum	Mean	Std Deviation
Product diversity 1	46	2	7	5.26	1.782
Product diversity 2	46	1	7	4.98	1.782
Product diversity 3	46	1	7	4.39	1.653
Product diversity 4	46	1	7	3.87	1.796
N	46				

Table 5.6
Importance of Cost Information

	N	Minimum	Maximum	Mean	Std Deviation
Importance of cost information 1	46	1	7	4.91	2.064
Importance of cost information 2	46	1	7	5.41	1.904
Importance of cost information 3	46	1	7	5.24	2.121
Importance of cost information 4	46	1	7	4.17	1.947
N	46				

Table 5.7
Legal Obligation

	N	Minimum	Maximum	Mean	Std Deviation
Legal obligation 1	46	1	7	5.20	1.721
Legal obligation 2	46	1	7	4.89	1.829
Legal obligation 3	46	1	7	4.48	1.847
Legal obligation 4	46	2	7	5.30	1.631
N	46				

Table 5.8
Uses of Cost Information

	N	Minimum	Maximum	Mean	Std Deviation
Uses of cost information 1	46	2	7	5.67	1.592
Uses of cost information 2	46	2	7	5.02	1.542
Uses of cost information 3	46	1	7	4.83	1.554
Uses of cost information 4	46	1	7	4.50	1.871
Uses of cost information 5	46	2	7	5.00	1.789
Uses of cost information 6	46	1	7	4.72	1.747
Uses of cost information 7	46	3	7	5.85	1.135
Uses of cost information 8	46	1	7	4.78	1.548
Uses of cost information 9	46	1	7	4.83	1.717
N	46				

5.4 Screening the Data

5.4.1 Detecting the Errors in the Categorical Data

Before describing every variable separately, the researcher checked all the categorical variables together to determine whether there were any mistakes in the answers and to make sure that all the respondents' answers were in the predetermined range. For instance, in this thesis, males were coded 1 and females 2; therefore, the answers should be either 1 or 2. Any other answer except 1 or 2 was considered an error. The position had four answers: manager, management accountant, financial accountant, and production manager. Experience had four answers as well, that is, less than 5 years, from 5 to 10 years, from 10 to 20 years, and more than 20 years. The level of education had five answers, specifically diploma, high diploma, degree, master's or PhD, and others. Qualification also had five answers: accounting, economics, finance, management, and others. The question regarding the working years in agriculture had four answers: less than three years, from three to six years, from seven to ten years, and more than ten years. The working years in the current agricultural firm had three answers – less than five years, from five to ten years, and more than ten years. Finally, the firm activity had five types: field crops, permanent crops, granivore (poultry), dairy and dry stock, and mixed products. Table 5.9 shows that there were no errors in the respondents' answers and all the answers were within the ranges.

Table 5.9
Checking the Errors in the Categorical Data

	Gender	Experience	Level of education	Working years in the firm	Number of employees	Activity	Size	Cost systems
N Valid	46	46	46	46	46	46	46	46
Missing	0	0	0	0	0	0	0	0
Minimum	1	1	1	1	1	1	1	1
Maximum	2	4	5	3	4	5	5	3

5.4.2 Detecting the Errors in the Continuous Data

Before proceeding to describe the continuous variables, the researcher checked the respondents' answers for mistakes. For instance, the question on firm revenues had three answers – 1, 2, and 3 – and any answer except those numbers was considered wrong.

The variable cost structure had five answers. All the other variables, including competition, product diversity, importance of cost information, legal obligation, and uses of cost information, had answers from 1 to 7. All the answers were within the range, so there were no errors (see Appendix 4). Errors can influence the results; therefore, the researcher checked the answers before starting to analyse the data. If the researcher found any errors in his data, he reverted to the original questionnaire to correct them (Pallant, 2007).

5.4.3 Missing Data

It is difficult to obtain complete data when researchers conduct studies involving human beings. Thus, it is important to inspect the data for missing data. Hair et al. (2010) argued that if the missing data for a particular question constitute 50% or more, it is better to cancel the question. However, researchers can replace missing data using the mean or median of nearby points. This thesis had only 2.7% missing data because the researcher distributed the data by hand; therefore, the respondents had the opportunity to ask the researcher for clarification of any ambiguous questions. Just one question related to cost structure was not answered by some respondents. This could be because many of the respondents were not accountants; therefore, they could not answer it. The researcher replaced the missing values with the median of nearby values since they constituted less than 3%.

5.4.4 Checking for Outliers

An outlier is a case that has a data value that is very different from the data values for the majority of cases in the data set (Hair et al., 2010). Deducting outliers is important because they can change the results of the data analysis. Researchers can use many techniques to discover outliers, such as the boxplot. If there are any values that are far away from the box, they are considered as outliers. Alternatively, they can classify data points based on the observed (Mahalanobis) distance from the research's expected values (Hair et al., 2010). In this thesis, the researcher counted the Mahalanobis distance for all the respondents and then compared the Mahalanobis values with the chi-square value, which was 37.652. After the comparison, the researcher found that one respondent was considered an outlier because the Mahalanobis distance values were more than the chi-square value (37.652). The Mahalanobis values were between 6.93 and 38.81119. One respondent had Mahalanobis values greater than the chi-square value. That respondent was considered an outlier and was omitted from the data. Hence, the regression in this thesis was performed using 45 (46-1) respondents.

5.5 Assumptions Underlying the Statistical Regressions

5.5.1 Assessing Normality

Normal distribution is a statistical term introduced by Sir Francis Galton in the late nineteenth century. Normal distribution refers to a theoretical frequency distribution that is bell-shaped and symmetrical with tails extending indefinitely from either side of the centre (Collis & Hussey, 2009). When conducting many statistical analyses, such as regression analysis, researchers assume that the variables are normally distributed, because non-normal data might lead to inflated goodness-of-fit statistics and underestimated standard errors; therefore, relying on non-normal data might impede the research's progress by providing inaccurate findings (Shook, Ketchen, Hult, & Kacmar, 2004). The normality test can be conducted in two ways, specifically the numerical method (skewness and kurtosis) or the graphical method (histogram, box plot, etc.) (Awal, Bakar, & Osman, 2011).

Skewness and kurtosis are some of the techniques used to determine the sample distribution; the skewness value provides an indication of the symmetry of the distribution, while the kurtosis value provides information about the peakedness of the distribution (Pallant, 2007). If the distribution is normal, the values of skewness and kurtosis should be zero; however, this value is uncommon in social science (Pallant, 2007). A skewness value of more than zero indicates that the curve has right-skewed distribution. This means that most values are concentrated to the left of the mean, with extreme values to the right. A skewness value of less than zero indicates that the curve has left-skewed distribution. This shows that most values are concentrated to the right of the mean, with extreme values to the left. However, if the skewness value is equal to zero, the distribution is symmetrical around the mean.

A positive kurtosis value indicates that the distribution is rather peaked or clustered in the centre with long thin tails, while a negative kurtosis value indicates a distribution that is relatively flat. Researchers argue that if the kurtosis value is more than three, it indicates that the distribution is sharper than normal, and a kurtosis value of less than three indicates that the distribution is flatter than normal (Awal et al., 2011). Hair et al. (1998) argued that a kurtosis value that is higher than three indicates non-normality.

Many researchers, however, know that in reality, results of perfectly normal distribution are rarely analysed, unless the analysis is based on a larger sample size. In this thesis, most of the values of skewness and kurtosis fell between the suggested standard – skewness values under one and kurtosis values under three (refer to Appendix 5.1 to see the table related to skewness and kurtosis). However, just three items had a skewness value of more than one, that is, one item from the importance of cost information (Impo2) and two items from the uses of cost accounting information (Uses 1 and Uses 7). As suggested by Coakes and Ong (2011), to make this data normally distributed, the researcher transformed the data using the SPSS software; then, the skewness values for the three items became less than one, as for the other items.

However, Pallant (2010) stated that the measures and scales used in the social sciences have scores that are skewed positively or negatively, but this skewness does not necessarily indicate a problem with the scale, although it sometimes reflects the underlying nature of the construct being measured. For instance, life satisfaction measures are often negatively skewed, with most people being happy with their life. Moreover, there are other ways to make sure that the data are distributed normally, such as looking at the normal probability plots (normal Q-Q plot), in which the observed value for each score is plotted against the expected value from the normal distribution. A reasonably straight line suggests a normal distribution (see Appendix 5.2 for the normal Q-Q plot). In addition, the detrended normal Q-Q plot supports normality because there is real clustering of points with most collecting around the zero line (Pallant, 2010).

5.5.2 Multicollinearity

As argued by Coakes and Ong (2011), multicollinearity means that there is a high correlation between the IVs. A high correlation between the IVs will lead to difficulties in interpreting the relationships between the variables. Therefore, before conducting multiple regressions, the researcher should make sure that there is no multicollinearity between the variables. The SPSS software provides two values to check the multicollinearity: tolerance and the variance inflation factor (VIF). Tolerance is an indicator of how much of the variability of specified IVs is not explained by the other IVs in the research model.

However, if the value of tolerance is very small, that is, less than .10, it indicates that the multiple correlation with other variables is high, which means the possibility of multicollinearity. In this thesis, the tolerance values for all the variables were more than .10, indicating that there was no multicollinearity problem in the data. The VIF value is the inverse of the tolerance value; if the VIF value is more than 10, it indicates multicollinearity. The VIF values of all the variables in this research were less than 10, supporting the results for tolerance, thus indicating that there was no multicollinearity in this research. Table 5.10 shows the values of tolerance and the VIF.

Table 5.10
Values of Tolerance and VIF

Model	Collinearity Statistics	
	Tolerance	VIF
Size	.951	1.051
Competition	.756	1.323
Product diversity	.782	1.278
Importance of cost information	.841	1.189
Legal obligation	.865	1.156
Cost structure	.710	1.408

5.5.3 Singularity

If the correlation between the variables is perfect at 0.9 and above, it means that there is singularity among the variables. Singularity can lead to the same problems that occur in multicollinearity. Singularity will make explaining the relationships between the IVs and the DV difficult (Coakes & Ong, 2011). Therefore, the correlation between the IVs and the DV should be known before proceeding with multiple regressions. According to Field (2005), singularity can be discovered by examining the correlation matrix of all the variables, which can be created using factor analysis. If there is any correlation greater than 0.9, the researcher should be aware of singularity in the data. The correlation between the variables in this thesis was less than 0.9; therefore, the researcher did not face singularity in the data (see Appendix 6 for the correlation matrix).

5.6 Measurement Codes

A review of the available literature showed that this is one of the few empirical studies to study the factors that influence the use of CASs in Libyan agricultural firms. It is one of the first attempts to understand the costing uses in agricultural activities. This research observed that the available literature indicates that most of the studies that focused on the use of CASs were conducted in the manufacturing and service sectors. This thesis adapted the variables derived from studies in the manufacturing and service sectors. In order to establish the reliability and validity of the data set, the researcher used EFA and reliability analysis to assess those items that measure the independent and dependent variables. Table 5.11 below contains a detailed list of all the items that were used in measuring the IVs and the DV dimension in the research framework.

Table 5.11

Detailed List of All the Items

Variable	Item	Code
Competition	This business unit faces intense competition from outside companies for business.	Com1
	Over approximately the past 10 years, the level of competition for our products has significantly increased.	Com2
	The price competition within agricultural firms is extremely intense.	Com3
	The level of competition in the market for the major products of our business unit is extremely intense.	Com4
Product diversity	The product fields are quite diverse.	Pro1
	Most products require different processes to plant, produce, and distribute.	Pro2
	There are major differences in volume/output across product fields.	Pro3
	The consumption of support department (e.g., engineering, purchasing, marketing) resources varies quite substantially across production fields.	Pro4
Importance of cost information	The cost of products must be highly reliable to compete in our markets.	Impro1
	Cost data are extremely important because of our cost reduction efforts.	Impro2
	Cost information is the most important factor when making product and service pricing decisions.	Impro3
	The business unit performs many special studies relating to product/service introduction, discontinuation, redesign, mix, or cost reduction decisions.	Impro4
Legal obligation	The Government connects the performance and the subsidy that the firm receives from the Government.	Leg1
	The firm must publish its financial reports.	Leg2
	Income tax is one of the factors that make the firm prepare financial statements.	Leg3
	The firm is subject to the Control Ministry, which makes it organizes its accounts and prepare financial statements.	Leg4
Uses of cost information	The cost accounting information is used for price decisions.	Uses1
	The cost accounting information is used for plant or buy decisions.	Uses2
	The cost accounting information is used for managing the firm activities.	Uses3
	The cost accounting information is used for formulating the firm budget.	Uses4
	The cost accounting information is used for executing the firm budget.	Uses5
	The cost accounting information is used for evaluating the firm inventory.	Uses6
	The cost accounting information is used for determining the firm product prices.	Uses7
	The cost accounting information is used for measuring the firm performance.	Uses8
	The cost accounting information in the firm is used for preparing private reports.	Uses9

5.7 Factor Analysis

Hair et al. (2010) explained that factor analysis refers to a statistical method that can be used to analyse the interrelationships among a large number of variables, to explain these variables in terms of their common underlying dimensions (factors), and to focus the information contained in a group of original variables into a smaller set of variables (factors) with minimal loss of information. However, factor analysis should not be carried out with fewer than 100 observations, because an increase in the sample size will decrease the level at which an item's loading on a factor is significant (Bartlett, Kotrlik, & Higgins, 2001).

According to the existing literature, there are two statistical measures that help to assess the factorability of the data, Bartlett's test and KMO. Bartlett's test of sphericity should be significant ($p < .05$) for factor analysis to be considered appropriate; on the other hand, the KMO index should range from 0 to 1 with .5 suggested as the minimum value for a good factor analysis (Field, 2005). Usually KMO is used to verify that the data set is suitable for factor analysis. Several values have been set for KMO to be acceptable. For instance, Pallant (2007) claimed that the KMO value should be 0.6 to be acceptable, while Kaiser (1974) stated that a KMO value greater than 0.5 is considered acceptable. Kaiser (1974) classified KMO values as follows: any value falling between 0.5 and 0.7 could be referred to as mediocre, values that are between 0.7 and 0.8 could be referred to as good, those between 0.8 and 0.9 could be seen as great, and finally those values that are above 0.9 could be categorized as superb.

The majority of the items in this thesis that were used to measure the variables (IVs and DV) were adapted from previous studies; therefore, three different factorial analyses were undertaken to re-examine the reliability and validity of these measures. This thesis on the Libyan agricultural sector is therefore assumed to be able to produce different results from prior studies that have been conducted in different countries on other sectors (manufacturing and services). The factor analysis in this thesis was conducted on every variable separately, as shown in the next sections.

5.7.1 Factor Analysis for the Level of Competition

An exploratory factor analysis was conducted to test the validity of the items that measure the level of competition. Four items were used to measure the level of competition. Principal component analysis (PCA) with varimax was carried out to determine whether the items were appropriate to measure the variable.

As shown in Table 5.12, the value of KMO, 0.721, is regarded as a mediocre value according to Kaiser (1974), Bartlett's test of sphericity was highly significant, sig. was 0.000 ($p < .05$), and chi-square was 82.139, meaning that the factor analysis was appropriate for this variable, as suggested in the literature (Field, 2005). The factor analysis results indicated that one component extracted met the recommended criterion of the given value greater than 1.0 (> 1.0), which explained a total variance of 68.332%. Moreover, none of the items were deleted because all the four items were grouped together in one component, no cross-loading was found between the four items, and all the items' loadings ranged from 0.763 to 0.925, which was above the minimum factor loading of 0.45 suggested by Hair et al. (2010).

Table 5.12
Factor Analysis Results for the Level of Competition

Items	Component 1
Over approximately the past 10 years, the level of competition for our products has significantly increased (com2).	.925
The price competition within agricultural firms is extremely intense (com3).	.832
The level of competition in the market for the major products of our business unit is extremely intense (com4).	.777
This business unit faces intensive competition from outside companies for business (com1).	.763
Eigenvalues	2.733
KMO	0.721
Bartlett's test of sphericity. Approx. chi-square	82.139
Significance	0.000
Cronbach's alpha	.840

5.7.2 Factor Analysis for Product Diversity

To test the validity of the items that measure product diversity, an exploratory factor analysis was conducted on four items that were used to measure product diversity. Principal component analysis (PCA) with varimax was carried out to determine whether the items were appropriate to measure the variable. Table 5.13 shows the value of 0.798 for KMO, and Bartlett's test of sphericity was significant ($p < .05$), which mean that the factor analysis was appropriate for this variable. The results indicated that a one-factor solution with an eigenvalue greater than 1.0 explained a total variance of 68.938%. All the four items were grouped together in one component, with no cross-loading between the items, and all the items' loadings ranged from 0.786 to 0.862, above the 0.45 suggested by Hair et al. (2010); therefore, none of the items was deleted.

Table 5.13
Factor Analysis Result for Product Diversity

Items	Component 1
There are major differences in volume/output across product fields (pro3).	.862
The product fields are quite diverse (pro1).	.855
Most products require different processes to plant, produce, and distribute (pro2).	.816
The consumption of support department (e.g., engineering, purchasing, marketing) resources varies quite substantially across production fields (pro4).	.786
Eigenvalues	2.758
KMO	.798
Bartlett's test of sphericity. Approx. chi-square	71.709
Significance	.000
Cronbach's alpha	.848

5.7.3 Factor Analysis for the Importance of Cost Information

An exploratory factor analysis was conducted to test the validity of the items that measure the importance of cost information. Four items were adapted from the literature and used to measure the importance of cost information. Principal component analysis (PCA) with varimax was undertaken to determine whether the items were appropriate to measure the variable. The factor analysis test led to one component that met the recommended criterion of a given value greater than 1.0 (> 1.0). The factor analysis was appropriate for this variable, as shown in Table 5.14, since the KMO value was 0.603 and Bartlett's test of sphericity was significant ($p < .05$).

Table 5.14

Factor Analysis Results for the Importance of Cost Information

Items	Component 1
Cost data are extremely important because of our cost reduction efforts (impo2).	.874
Cost information is the most important factor when making product and service pricing decisions (impo3).	.861
The cost of products must be highly reliable to compete in our markets (impo1)	.606
The business unit performs many special studies relating to product/service introduction, discontinuation, redesign, mix, or cost reduction decisions (impo4).	.565
Eigenvalues	2.192
KMO	.603
Bartlett's test of sphericity. Approx. chi-square	48.909
Significance	.000
Cronbach's alpha	.537

5.7.4 Factor Analysis for Legal Obligation

An exploratory factor analysis was conducted to test the validity of the four items that measure legal obligation. Principal component analysis (PCA) with varimax was performed to determine whether the items were appropriate to measure the variable. As shown in Table 5.15, one factor met the recommended criterion of a given value greater than 1.0 (> 1.0), which explained a total variance of 67.709%. The value of KMO was 0.759 and Bartlett's test of sphericity was highly significant with 0.000 ($p < .05$), which mean that the factor analysis was appropriate for this variable as well. The results indicated that one of the items needed to be deleted because all the four items were grouped together in one component, there was no cross-loading between the items, one item loaded less than 0.45, thus it was deleted, and the rest of the items' loadings were above the 0.45 suggested by Hair et al. (2010).

Table 5.15
Factor Analysis Results for Legal Obligation

Items	Component 1
Income tax is one of the factors that make the firm prepare financial statements (leg3).	.909
The firm must publish its financial reports (leg2).	.776
The Government connects the performance and the subsidy that the firm receives from the Government (leg1).	.776
Eigenvalues	2.031
KMO	.586
Bartlett's test of sphericity. Approx. chi-square	38.388
Significance	.000
Cronbach's alpha	.759

5.7.5 Factor Analysis for the Uses of Cost Information

An exploratory factor analysis was conducted to test the validity of the nine items used to measure the uses of cost information. Principal component analysis (PCA) with varimax was undertaken to determine whether the items were appropriate to measure this variable. The first test led to two components that met the recommended criterion of a given value greater than 1.0 (> 1.0). The value of KMO was 0.735 and Bartlett's test of sphericity was significant ($p < .05$). The items were loaded on one component as presented in Table 5.16.

Table 5.16

Factor Analysis Results for the Uses of Cost Information

Items	Component 1
The cost accounting information in the firm is used for preparing private reports (uses9).	.789
The cost accounting information is used for managing the firm activities (uses3).	.782
The cost accounting information is used for measuring the firm performance (uses8).	.765
The cost accounting information is used for plant or buy decisions (uses2).	.732
The cost accounting information is used for price decisions (uses1).	.703
The cost accounting information is used for determining the firm's product prices (uses7).	.681
The cost accounting information is used for executing the firm budget (uses5).	.668
The cost accounting information is used for evaluating the firm inventory (uses6).	.590
The cost accounting information is used for formulating the firm budget (uses4).	.552
Eigenvalues	4.411
KMO	.732
Bartlett's test of sphericity. Approx. chi-square	194.667
Significance	.000
Cronbach's alpha	.831

In brief, the factor analysis output for the IVs proposed in this thesis's framework yielded almost the same number of items: for the level of competition, four items, for product diversity, four items, for legal obligation, three items, for the importance of cost information, four items, and for the uses of CASs, nine items.

5.8 Bivariate Correlation

To describe the direction and the strength of the linear relationship between the variables, the researcher conducted bivariate correlation. This thesis used the Pearson correlation coefficient, which takes only one value from -1 to +1 (Pallant, 2007). A positive correlation has a positive value, which means that if one variable increases, the other variable will increase too, while a negative correlation occurs when the correlation value between the variables is negative, which means that if one variable increases, the other one will decrease. Table 5.17 shows the relationships between the thesis's variables.

The results indicate that there was a negative correlation between the firms' size and their cost structure (-0.042), the firms' size and their level of competition (-0.017), the cost structure and the level of competition (-0.380), the cost structure and the product diversity (-0.104), the cost structure and the importance of cost information (-0.134), and the cost structure and legal obligation (-0.383). However, there was a positive correlation between all the other variables; the value of the Pearson correlation coefficient was between 0.026 and 0.442, which meant that there was a positive relationship between those variables.

Table 5.17
Pearson Correlation Coefficient

		Size	Cost structure	Com	Pro	Impo	Leg	Uses
Size	Pearson correlation	1						
	Sig. (2-tailed)							
	N	45						
Cost structure	Pearson correlation	-.042	1					
	Sig. (2-tailed)	.784						
	N	45	45					
Competition	Pearson correlation	-.017	-.380**	1				
	Sig. (2-tailed)	.911	.010					
	N	45	45	45				
Product diversity	Pearson correlation	.111	-.104	.101	1			
	Sig. (2-tailed)	.467	.495	.510				
	N	45	45	45	45			
Importance of cost information	Pearson correlation	.135	-.134	.307*	.161	1		
	Sig. (2-tailed)	.376	.381	.040	.292			
	N	45	45	45	45	45		
Legal obligation	Pearson correlation	.170	-.383**	.212	.384**	.205	1	
	Sig. (2-tailed)	.263	.009	.163	.009	.176		
	N	45	45	45	45	45	45	
Uses of CASs	Pearson correlation	.343*	.026	.296*	.159	.422**	.442**	1
	Sig. (2-tailed)	.021	.863	.048	.297	.004	.002	
	N	45	45	45	45	45	45	45

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Moreover, the correlation between the IVs and the DV showed that a significant positive relationship exists between the agricultural firms' size and their use of CASs ($r = .343$, $P < .05$), a significant positive relationship between the level of competition and the use of CASs ($r = .269$, $P < .05$), a significant positive relationship between the importance of cost information and the use of CASs ($r = .422$, $P < .05$), and a significant positive relationship between legal obligation and the use of CASs ($r = .442$, $P < .05$). On the other hand, there was a weak relationship between the product diversity and the use of CASs ($r = .159$, $P = .05$) and a weak relationship between the cost structure and the use of CASs ($r = .026$). The relationship between the two variables was not significant ($P > .05$)

The relationship strength between the variables was determined by the value of the Pearson correlation coefficient. Cohen (1988) suggested that if the value of the Pearson correlation coefficient is between 0.10 and 0.29, the correlation is considered small, but if the Pearson correlation coefficient is between 0.30 and 0.49, the correlation is considered medium; however, if the Pearson correlation coefficient is between 0.50 and 1.0, it is considered large. In this thesis, the relationship strength between the variables ranged from small to medium. Table 5.18 shows the correlation strength between the variables. The strength of the negative values was the same as that for the positive values but there was a difference in the direction.

Table 5.18

Correlation Strength between the Variables

Variables	Pearson correlation coefficient	Strength
Size and competition	-.017	Small
Size and product diversity	0.111	Small
Size and importance of cost information	0.135	Small
Size and legal obligation	0.170	Small
Size and cost structure	-0.042	Small
Size and use of cost accounting system	0.343	Medium
Competition and product diversity	0.101	Small
Competition and importance of cost information	-0.307	Medium
Competition and legal obligation	0.212	Small
Competition and cost structure	-0.380	Medium
Competition and use of cost accounting system	0.269	Small
Product diversity and importance of cost information	0.161	Medium
Product diversity and legal obligation	0.384	Medium
Product diversity and cost structure	-0.104	Small
Product diversity and use of cost accounting system	0.159	Small
Importance of cost information and legal obligation	0.205	Small
Importance of cost information and cost structure	-0.134	Small
Importance of cost information and use of cost accounting system	0.422	Medium
Legal obligation and cost structure	-0.383	Medium
Legal obligation and use of cost accounting system	0.442	Medium
Cost structure and use of cost accounting system	0.026	Small

5.9 Multiple Regressions

The linear regression model to examine the relationship between the factors that influence the implementation of CASs and the use of CASs is explained below:

$Y = \alpha + \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \beta x_5 + \beta x_6 + e$

where
Y = use of cost accounting systems
X_1 = size
X_2 = cost structure
X_3 = level of competition
X_4 = product diversity

X_5 = importance of cost information
X_6 = legal obligation
e = random error

The regression model after analysing the data is as follows:

$Y = -.575+ .257\ X_1 + .334X_2 + .257X_3 + -.075X_4 + .274X_5 + .444X_6 + e$

5.9.1 Evaluating the Model

Pallant (2010) stated that beta values are used to evaluate the contribution of each IV to explaining the DV. A variable that has a high value contributes better than those that have low values. This thesis examined the influence of the six IVs on the use of CASs, namely firm size, cost structure, competition, product diversity, importance of cost information, and legal obligation. As shown in Table 5.19, legal obligation, cost structure, and importance of cost information had high beta values of 0.444, .334, and 0.274, respectively. Those variables contributed better than the other variables to explaining the DV (the use of CASs). Legal obligation had the highest beta value of 0.444, which meant that a 44% change in legal obligation led to a 44% change in the use of CASs in the Libyan agricultural firms.

Table 5.19
Beta Values

Variables	Standardized coefficients Beta
Size	.257
Cost structure	.334
Competition	.257
Product diversity	-.075
Importance of cost information	.274
Legal obligation	.444

Table 5.20, the model summary, shows the value of R square, which explains how much of the variance in the DV is explained by the model (Pallant, 2010). In this thesis, the R value for this model was .688, which meant that there is a good correlation between all the IVs and the DV. The R square value was 0.473; when this value was changed to a percentage, the model explained 47.3% of the variance in the DV, meaning that more than 47% of the DV is explained linearly by the IVs. On the other hand, 53% of the DV cannot be explained by the IVs, which means that there are other variables that explain the DV. However, when the research sample is small, R square is considered to be an overestimation of the true value in the population. Therefore, it is better to rely on the adjusted R square, which will provide a better estimate of the true population value instead of the normal R square value (Pallant, 2010). In this thesis, the sample is quite small; therefore, it was better to rely on the adjusted R square, which was 0.390.

An ANOVA table was used to test the goodness of the overall model. In Table 5.21, the F statistics show that F = 5.685, with $P = 0.000 < 0.05$. From these results, it is apparent that the model of regression makes a good job of explaining the relationships between the IVs (firm size, cost structure, level of competition, product diversity, importance of cost information, and legal obligation) and the DV (the use of CASs).

Table 5.20
Model Summary

Model	R	R square	Adjusted R square	Std error of the estimate
1	.688[a]	.473	.390	.76394

Table 5.21
Anova

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	19.908	6	3.318	5.685	.000[a]
	Residual	22.177	38	.584		
	Total	42.085	44			

Furthermore, the sig. value was used to determine whether the variable made a significant unique contribution to the equation; if the value of sig. is less than .05, it means that the IV is statistically significantly related to the DV. In this thesis, four variables were found to be statistically significantly related to the use of CASs in the Libyan agricultural firms – size, cost structure, importance of cost information, and legal obligation – as shown in Table 5.22. However, Table 5.22 shows that 2.12% of the use of CASs in the Libyan agricultural firms was caused by size, whereas 3.17% of the use of CASs was caused by legal obligation. It can be observed that legal obligation had the highest influence on the use of CASs in Libyan agricultural firms because a 1% change in legal obligation led to a 3.17% change in the use of CASs.

Table 5.22
Values of T and P

Variables	T	Sig.
Size	2.128	.040
Cost structure	2.465	.018
Competition	1.932	.061
Product diversity	-.587	.561
Importance of cost information	2.168	.036
Legal obligation	3.176	.003

5.10 One-Way Anova (Post-Hoc Test)

This thesis used objective measurements to measure the size and cost structure; both variables were found to be statistically significantly related to the use of CASs in the Libyan agricultural firms. Size consists of three groups: small (between 100,000 and 900,000 Libyan dinars), medium (between 1 million and 900,000 million Libyan dinars), and large (greater than 10 million Libyan dinars), and the cost structure consists of five groups (the balanced category, 50% direct costs and 50% indirect costs, and unbalanced categories consisting of 60% direct costs and 40% indirect costs, 70% direct costs and 30% indirect costs, 80% direct costs and 20% indirect costs, and 90% direct costs and 10% indirect costs).

The researcher conducted a one-way Anova (post-hoc test) to compare the means of groups that have been determined to have some overall statistical differences and to identify which group is more influential on the use of CASs (Pallant, 2010). Two assumptions must be met to conduct a one-way Anova (post-hoc test), the data are normally distributed and the homogeneity assumption has not been violated, which means Levene's test of homogeneity of variances is not significant at $P > 0.05$ (Coakes & Ong, 2011). The paragraphs below present the one-way Anova (post-hoc test) for the size and cost structure.

5.10.1 Size

Size was found to be statistically significantly related to the use of CASs; because the size measured by objective measurement consists of three groups, a one-way Anova (post-hoc test) was conducted to identify which one of the three groups considers the use of CASs to be more important to its firms. Table 5.23 shows that the assumption of homogeneity of variances was not violated, since the P value is greater than 0.05 (P = 0.181).

Table 5.23
Test of Homogeneity of Variances for Size

Levene statistic	df1	df2	Sig.
1.848[a]	1	42	.181

Pallant (2010) argued that if the value of P in the Anova table is less than 0.05, there is a significant difference among the mean scores for the three groups, whereas if the value of P is greater than 0.05, it means that there is no significant difference among the mean scores for the three groups. In this thesis, the value of P was greater than 0.05, meaning that a significant difference among the mean scores for the three groups did not exist, as shown in Table 5.24.

Table 5.24
Anova for Size

	Sum of squares	Df	Mean square	F	Sig.
Between groups	5.152	2	2.576	2.929	.064
Within groups	36.933	42	.879		
Total	42.085	44			

5.10.2 Cost Structure

This thesis found that there is a positive and statistically significant relationship between the cost structure and the use of CASs. A one-way Anova (post-hoc test) was conducted to identify which one of the five groups considers the use of CASs to be more important to its firms. Table 5.25 shows that the assumption of homogeneity of variances was not violated, since the P value was greater than 0.05 (P = 0.808).

Table 5.25
Test of Homogeneity of Variances for Cost Structure

Levene statistic	df1	df2	Sig.
.400	4	40	.808

Table 5.26 shows the Anova table; the value of P is greater than 0.05, which means that there is no significant difference among the mean scores for the five groups.

Table 5.26
Anova for Cost Structure

	Sum of squares	df	Mean square	F	Sig.
Between groups	7.634	4	1.909	2.216	.084
Within groups	34.451	40	.861		

5.11 Hypothesis Testing

To test a hypothesis, the P and T values are important indicators to determine whether the hypothesis is supported or not. A positive T value indicates that there is a positive relationship between the variables tested, whereas a negative T value indicates that there is a negative relationship between the variables tested. However, the P value determines whether the relationship between the tested variables is statistically significant or not. A P value greater than .05 indicates that the IV does not significantly impact on the DV, while a P value less than .05 indicates that the IVs significantly impact on the DV. Therefore, the researcher used the P and T values to determine whether the hypotheses were supported or not.

H_1 There is a positive relationship between the size of Libyan agricultural firms and the use of CASs.

The main purpose of this hypothesis is to ascertain whether the Libyan agricultural firms' size is one of the important determinants of their use of CASs.

As shown in Table 5.22 above, the hypothesis "there is a positive relationship between the size of the Libyan agricultural firms and the use of CASs" was supported. Because the T value was 2.128, this meant that there was a positive relationship between the firms' size and their use of CASs, while the P value of .040 was less than .05, which meant that the size is associated significantly with the use of CASs in the Libyan agricultural firms. These results confirmed the argument of previous studies, such as Malmi (1999), who found a significant relationship between the implementation of ABC and the firms' size. Furthermore, the correlation in Table 5. 18indicates a strong positive relationship between the agricultural firms' size and their use of CASs, which was significant at the 0.01 level.

H_2 There is a positive relationship between the cost structure and the use of CASs in Libyan agricultural firms.

The purpose of this hypothesis is to determine whether the cost structure is one of the important determinants of the use of CASs in Libyan agricultural firms.

The statistical analysis in Table 5.22 indicates that the T value was 2.465, which meant that the relationship between the cost structure and the use of CASs was positive; the hypothesis was supported as there was a positive relationship between the cost structure and the use of CASs in the Libyan agricultural firms. Because the P value was .018, a value less than .05, it meant that the association between the cost structure and the use of CASs was statistically significant.

H_3 There is a positive relationship between the level of competition and the use of CASs in Libyan agricultural firms.

The purpose of this hypothesis is to ascertain whether the level of competition is one of the important determinants of the use of CASs in Libyan agricultural firms.

Table 5.22 shows that the hypothesis was not supported, as there was a positive relationship between the level of competition and the use of CASs, although the T value was 1.932, which meant that the relationship between the level of competition and the use of cost accounting was positive, and the P value for the level of competition (.061) was greater than .05. That meant that the competition was not associated significantly with the use of CASs in the Libyan agricultural firms. However, the relationship between them would be significant if the study used 10% (.10) as the significance level.

H_4 There is a positive relationship between the product diversity and the use of CASs in Libyan agricultural firms.

The purpose of this hypothesis is to determine whether product diversity is one of the important determinants of the use of CASs in Libyan agricultural firms.

The hypothesis was not supported as there was a negative relationship between the product diversity and the use of CASs in the Libyan agricultural firms. As shown in Table 5.22, the T value (-.075) indicates that there is a negative relationship between the product diversity and the use of CASs. The P value for product diversity was -.587, which is greater than .05, meaning that the impact of product diversity on the use of CASs was not statistically significant.

H_5 There is a positive relationship between the importance of cost information and the use of CASs in Libyan agricultural firms.

The main purpose of this hypothesis is to check whether the importance of cost information is one of the important determinants of the use of CASs in Libyan agricultural firms.

The hypothesis was supported as there was a positive relationship between the importance of cost information and the use of CASs in the Libyan agricultural firms; because the T value was 2.168, it meant that there was a positive relationship between the importance of cost information and the use of CASs. Moreover, the P value was .036, which means that the importance of cost information impacts on the use of CASs in the Libyan agricultural firms. This finding supports the results from previous studies that investigated the importance of cost information in other sectors, such as the manufacturing sector. For instance, Al-Omiri and Drury's (2007) study found that the importance of cost information influences the choice of CASs in British firms.

H_6 There is a positive relationship between the legal obligation and the use of CASs in Libyan agricultural firms.

The main purpose of this hypothesis was to ascertain whether legal obligation is one of the important determinants of the use of CASs in Libyan agricultural firms.

Table 5.22 shows that the regression results supported the hypothesis as there was a positive relationship between the legal obligation and the use of CASs in the Libyan agricultural firms, because the T value was 3.176, which meant that there was a positive relationship between the legal obligation and the use of CASs. Furthermore, the P value was 0.003, which meant that the legal obligation significantly impacts on the use of CASs in the Libyan agricultural firms. These results indicated that a 3.17% change in legal obligation leads to a change in the use of CASs of 3.17%. Table 5.27 presents a summary of the hypothesis testing.

Table 5.27

Summary of Hypothesis Testing

No.	Hypothesis	Supported/not supported
H_1	There is a positive relationship between the size of agricultural firms and the use of cost accounting systems in Libyan agricultural firms.	Supported
H_2	There is a positive relationship between the cost structure and the use of cost accounting systems in Libyan agricultural firms.	Supported
H_3	There is a positive relationship between the level of competition and the use of cost accounting systems in Libyan agricultural firms.	Not supported
H_4	There is a positive relationship between the product diversity and the use of cost accounting systems in Libyan agricultural firms.	Not supported
H_5	There is a positive relationship between the importance of cost information and the use of cost accounting systems in Libyan agricultural firms.	Supported
H_6	There is a positive relationship between the legal obligation and the use of cost accounting systems in Libyan agricultural firms.	Supported

5.12 Interview Data Analysis

This thesis relied on interviews to answer questions 1, 2, 4, and 5. Interviews were used to understand how CASs are used in Libyan agricultural firms. Interviews were conducted with financial managers, management accountants, and production managers to answer the research questions related to understanding how Libyan agricultural firms use CASs. Specifically, interviews were conducted to answer the following research questions: 1) Do Libyan agricultural firms use CASs or not? 2) To what extent do Libyan agricultural firms use CASs? 3) How do agricultural firms in Libya allocate overhead costs to their products? 4) How do agricultural firms in Libya calculate their product costs?

This thesis undertook semi-structured interviews with open-ended questions to answer the four research questions mentioned earlier. The interviews consisted of four sections: information about the respondents, information about the firms, information about CASs, and the perspective of the interviewees. Table 5.28 presents the respondents' positions and the date of the interviews.

Table 5.28
Interviewees' Information

Respondent ID	Current position and the company's name	Interview date	Duration of the interview
1	Production manager (Tssawa agricultural firm)	1 February 2012	One and a half hours
2	Financial manager (Mknusha agricultural firm)	3 February 2012	One hour
3	Financial manager (Deeseh agricultural firm)	5 February 2012	One and a half hours
4	Management accountant (Aldboat agricultural firm)	9 February 2012	One hour
5	Financial manager (Barjuj agricultural firm)	26 & 27 February 2012	Two hours
6	Management accountant (Alariel agricultural firm)	7 March 2012	Two and a half hours

The researcher conducted six interviews, in February and March 2012, totalling around 11 hours. The first interview was with Mr Husain Bawa, the production manager in the Tssawa agricultural firm. This interview was conducted on 1 February 2012 and took one and a half hours, from 10:30 a.m. to 12:00 noon. The interviewee provided the researcher with several documents related to the production processes as well as financial and cost documents. The second interview was conducted with Mr Mohamed

Zayed, the financial manager of the Mknusha agricultural firm. This interview was conducted on 3 February 2012 for one hour from 12:15 p.m. to 1:15 p.m., and the researcher returned at 2:00 p.m. to collect the firm's cost statement. The third interview was conducted with Mr Mohamed Abdullah, a financial accountant. This interview was conducted on 5 February 2012 for one and a half hours from 1:00 p.m. to 2:30 p.m.

The fourth interview was conducted with Mr Ahmad Alsalheen, a management accountant. This interview was conducted on 9 February 2012 for one hour during breakfast time, from 10 a.m. to 11 a.m. The fifth interview was conducted with Mr Mohamed Shmasa, the financial accountant in the Barjuj agricultural firm. This interview was conducted on 26 and 27 February 2012 for two hours – the first hour was after working hours from 5:00 p.m. to 6:00 p.m. and the other hour was during lunchtime the next day, from 12:30 p.m. to 1:30 p.m. The last interview was conducted on 7 March 2012, lasting for two and a half hours, with Abo Alqasm Alsalheen, the management accountant in the Alariel agricultural firm, for one hour from 10 a.m. to 11 a.m. during breakfast time and for another one and a half hours after working hours.

Interviews were conducted with persons in different positions: two of the interviewees were management accountants, three of them were financial managers, and one was a production manager, as shown in Table 5.29. Three of the interviewees, that is, two management accountants and one financial manager, have degrees in accounting, while one of the interviewees, who is a financial manager, has a master's in accounting, and the other interviewees have certification in management and plantation science. Tables 5.30 and 5.31 summarize the interviewees' level of education and qualifications. With regard to the establishment of the agricultural firms, the interviewees gave different dates. Some of the firms have been in operation for more than thirty years, two of the firms were established in 1978, and one was established in 1979. One of the firms was established in 1986, and the other two firms were considered quite recent, established in 1999 and 2000, respectively, as shown in Table 5.32.

Table 5.29
Interviewees' Position

	Management accountant	Financial manager	Production manager
The respondents' position	2	3	1

Table 5.30
Interviewees' Level of Education

	Degree	Master's
The interviewees' level of education	5	1

Table 5.31
Interviewees' Qualifications

	Accounting	Management	Plantation science
The respondents' qualifications	4	1	1

Table 5.32
Establishment of the Firms

	1	2	3	4	5	6
Establishment of the firm	1986	1999	2000	1978	1978	1979

All of the respondents stated that more than one hundred employees work in their firms. Some of them stated specific numbers of workers, including 146, 180, 230, and 260. However, one of them claimed that 146 employees work in the firm throughout the whole year, while during the cultivation and harvesting periods, it hires more workers, reaching up to 250. Table 5.33 depicts the number of workers in every firm. From Table 5.34, it can be seen that two respondents stated that their firms produce only grains (barley, wheat, corn, etc.), whereas three respondents stated that their firms produce grains and livestock, and only one of the interviewees mentioned that his firm produces grains, vegetables, fruits, and livestock.

Table 5.33
Number of Employees

	1	2	3	4	5	6
Number of workers in the firm	180	146–250	190	146	260	230

Table 5.34
Type of Products

	1	2	3	4	5	6
Type of production	Grains and livestock	Grains	Grains	Grains and livestock	Grains and livestock	Grains, vegetables, fruits, and livestock

All of the respondents mentioned that their firms have almost the same strategies, which include offering food (grains, milk, and meat) at low prices and offering job opportunities to Libyan citizens. The firms located in the desert have another strategy, which is fighting desertification, and one of the firms has a specific strategy, that is, improving the quality of seeds for the next year's plantation. With regard to the size of agricultural firms' land, the firms have different sizes as follows: 3,500 acres, 3,650 acres, 4,000 acres, and 5,000 acres. Tables 5.35 and 5.36 show the firms' strategy and size.

Table 5.35
Firms' Strategy

	Respondents	Response
The firm strategy	1	Offer food at low prices and job opportunities.
	2	Offer grains and job opportunities.
	3	We have two strategies – first, to provide cereals (barley, wheat, corn) for consumption and second, to improve the seeds' quality for the next year's plantation.
	4	Offer cereals (barley, wheat, and oats) and legumes (beans, chickpeas, and lentils).
	5	Achieve food self-sufficiency, offer job opportunities, use natural resources (water, soil) in a perfect way, and cultivate more ground to overcome desertification.
	6	Offer different types of food at low prices, fight desertification, and offer job opportunities to Libyan citizens.

Table 5.36
Size of the Agricultural Firms' Land

	1	2	3	4	5	6
The firm size	3500 acres	4000 acres	5000 acres	4000 acres	3650 acres	5000 acres

The researcher expected the interviewees to report that there are cost departments in their firms. However, most of the interviewees stated that there is no cost accounting department in their firm, but that there is a unit or office of cost accounting under the financial department. On the other hand, one of the interviewees stated that in his firm, there is no cost accounting department at all, but there are some employees in the financial department who determine the product cost. Moreover, one of the interviewees argued that his firm used to have a cost accounting department but it closed down that department. Currently, there is an office of cost accounting in the financial department. Table 5.37 shows the responses concerning CAS departments.

Table 5.37

Cost Accounting System Departments

	Respondents	Response
Cost accounting department	1	We have a unit of cost accounting under financial accounting.
	2	There is a cost accounting system department but it is not an independent department, it is under the financial department.
	3	We do not have a cost accounting department; the product cost is determined by some employees in the financial department.
	4	We have a unit of cost accounting in the financial department.
	5	We do not have a cost accounting department.
	6	We used to have a cost accounting system department; however, now we have an office of cost accounting under financial accounting.

To determine the product costs, some of the interviewees stated that there are four cost elements in their firms: labour cost (e.g., salaries, wages), production requirements (e.g., seeds, fertilizers, pesticide), operations and maintenance (e.g., spare parts, oil, electricity, subsistence), and managerial expenses (e.g., stationery, telephones). If the firms produce one product, for instance barley, they gather all of the expenses and then divide them by the cultivated area, and to determine the quintal cost, they divide the acre's cost by the acre's productivity. For example, a firm cultivated 1,000 acres of barley and the total cost was 300,000 dinars. First, it determined the acre cost, which will be 300,000 dinars / 1,000 acres = 300 dinars, meaning that every acre cost 300 dinars; to determine the quintal (100 kg) cost, it divided the acre cost by the acre productivity, so if an acre produces 10 quintals, the quintal cost will be 300 dinars / 10 quintals = 30 dinars.

If firms produce more than one product (barley and wheat), the interviewees stated they use the cultivated area as well. For example, if they cultivate 1,000 acres (700 acres of barley and 300 acres of wheat), and the total cost is 300,000 dinars, they use the percentage to determine each product cost separately. First of all, they find out the percentage of every product from the cultivated area as follows: for barley (1,000 acres / 700 acres × 100 = 70%) and for wheat (1,000 acres / 300 acres × 100 = 30%). The barley cost will be 70% of the total cost of 300,000 dinars, which will be 210,000 dinars, whereas the wheat cost will be 30% of the total cost of 300,000 dinars, which will be 90,000 dinars. However, if the firm produces different types of products, not just grain, for instance grain, vegetables, fruit, and livestock, the interviewees said that it would be difficult to determine the product cost exactly, especially the overhead costs, because the workers and the machines serve all the crops at the same time, while the harvesting time is different. Therefore, they stated that all the overheads are allocated to essential activity (usually grain). One of the interviewees stated that they do not determine the product cost, and to set the product price, they rely on market prices or sometimes the Government sets the prices. Such firms are usually fully or partly supported by the Government. Table 5.38 summarizes the answers of all the respondents related to determining their product costs.

Table 5.38

Summary of the Responses regarding Determining the Product Cost

	Respondents	Response
Determining the product cost	1	The firm gathers all the expenses and divides them by the cultivated area to determine the acre cost. The livestock cost faces many problems.
	2	All the costs are calculated and divided by the cultivated area to determine the acre cost if the firms produce one type of grain; however, if they produce more than one type, they determine the cultivated area for every product separately then they determine the cost of every product using the cultivated area. Then the acre cost is divided by the acre production to determine the quintals (100 kg) cost.
	3	We calculate all the expenses during the season and then divide them by the cultivated area or the production to determine the ton cost or the acre cost.
	4	We calculate the materials' cost (seeds, fertilizers, pesticides), labour cost (employees' salaries), and other expenses (electricity, telephone, stationery, oil) during the season and then divide them by the production to determine the cost of quintals (100 kg).
	5	We rely on market prices; sometimes the Agricultural Ministry determines the price.
	6	We have many difficulties in determining the product cost, because we produce different types of products and there are many workers and machines serving different crops at the same time, while the harvesting time is different. Therefore, most of the cost is loaded onto the cereals department because it is considered the essential department; therefore, all the overhead costs are allocated to this department.

With regard to the use of cost information, all the interviewees stated that they use cost information to determine the products' prices, while three of them stated that they use cost information for cost control and to determine the product cost. However, some of them said that they use cost information to determine the minimum price, make a comparison between the year's expenses, and determine the extra activities. Table 5.39 presents the use of cost accounting information.

Table 5.39
Uses of Cost Information

	Respondents	Response
Uses of cost information	1	Cost information is used in cost control and pricing decisions.
	2	Cost information is used in product pricing, decreasing product costs, controlling, and determining extra activities.
	3	Cost information is used for determining the product cost, setting the price, and making comparisons between the year's expenses.
	4	Cost information is used in cost control and for pricing.
	5	Cost information is used to determine the minimum price.
	6	The firm uses cost information to determine the product cost to set the selling prices.

In relation to the costing methods used to calculate the product cost, the interviewees stated that they use full costing. On the other hand, as shown in Table 5.40, first-in-first-out (FIFO) and the weighted average are used by almost all of the firms to treat the stock. This finding is supported by Prickett (1944), who stated that the average cost is the best method to treat the inventory. Most of the firms use two methods to treat the inventory – for production, fertilizers, and pesticides, they use FIFO, while for spare parts, they use the weighted average – although some of them stated that for spare parts, they do not use any method because the use of spare parts relies on the needs of the maintenance department.

Table 5.40
Stock Methods

	Respondents	Response
Inventory valuation	1	Weighted average
	2	Weighted average
	3	First-in-first-out
	4	First-in-first-out and weighted average
	5	Weighted average
	6	First-in-first-out and weighted average

Concerning product pricing, the interviewees mentioned that the Libyan Government recommended that after determining the product cost, the firms should add 10% as the profit margin. Sometimes, the Government sets the prices and pays any losses in the case that the price was less than the cost. Some of the agricultural firms add 10% as the profit margin; however, one of the interviewees stated that the firm relies on the market prices for some products, such as vegetables, fruits, and livestock, while it adds 10% as the profit margin for cereals, such as barley and wheat. In brief, for agricultural firms that rely on the Government to subsidize them, the Libyan Government sets the prices because it will cover any losses, whereas agricultural firms that support themselves determine the product cost then add 10% as the profit margin. Table 5.41 presents the responses related to product pricing.

Table 5.41
Product Pricing

	Respondents	Response
Product pricing	1	The firm relies on market prices.
	2	First the firm determines the product cost and then it adds a profit margin from 5% to 10% of the total cost.
	3	We add 10% of the total cost as the profit margin.
	4	Market prices and sometimes the Government sets the prices.
	5	The firm adds 10% of the total cost.
	6	For livestock, vegetables, and fruits, we rely on market prices regardless of the product cost, while for cereals, we determine the cost and then we add 10% of the total cost as the profit margin.

As shown in Table 5.42, most of the interviewees stated that they allocate the overhead costs to the plantation department because it is the main activity; therefore, they use the cultivated area to allocate the overhead costs. One of the interviewees stated that the firm uses three bases to allocate costs, specifically the number of workers, field area, and working hours. Although the literature explains that ABC is suitable for farming activities, all the respondents stated that they use traditional costing. With regard to the cost structure, all the respondents gave near percentages: the first respondent stated that he is not sure about the cost structure, while two of the interviewees report a 60% direct cost and a 40% indirect cost. Others stated a 50% direct cost and a 50% indirect cost, while one of them divided the cost structure as follows: labour cost – 50% direct cost and 50% indirect cost, other costs – 70% direct cost and 30% indirect cost. In term of classifying the cost, the researcher expected that they must categorize the cost to facilitate various decisions; however, all of the interviewees mentioned that they do not categorize the cost.

Table 5.42
Allocation of Overhead Costs

	No	Response
Allocation of overhead costs	1	The firm allocates overhead costs to the plantation department.
	2	The firm uses the area to distribute the overhead costs.
	3	We allocate overheads according to the cultivated area.
	4	The planted area is used to allocate the overhead costs.
	5	Three bases are used to allocate the overhead costs: the number of workers, field area, and working hours.
	6	The cultivated area is used to allocate the overhead costs.

As shown in Table 5.43, the interviewees said that cost information is useful for agricultural firms in several ways: setting the selling prices, determining the product cost, minimizing the cost, identifying the deviation, and determining the field profitability. Four of the interviewees thought that the use of cost accounting would improve the products, especially in a competitive environment in which firms need to decrease their cost and improve their product quality. The interviewees also stated that water and arable land are scarce resources in Libya and the use of cost accounting would assist the Libyan agricultural firms to use those resources perfectly.

Table 5.43
Usefulness of Cost Information

	Respondents	Response
Usefulness of cost information	1	Yes, the firm uses cost information to determine the product cost.
	2	It is useful for pricing, competition, increasing the sales, and identifying the deviations.
	3	Useful for determining the product cost and cost control.
	4	Cost information assists managers to set many decisions related to setting the selling prices, cost control. and determining the fields' profitability.
	5	Cost information is useful in making several decisions and cost control.
	6	Cost information is useful for agricultural firms in setting the selling prices, cost control. and decreasing the product costs.

In agricultural firms, as in other firms, one department's output is used as another department's input; for instance, they use the plantation's output (hay) as the livestock's input to feed animals and the livestock department's output as the service department's input (meat to prepare workers' meals). However, the interviewees stated that they do not count the transfer prices between departments, as shown in Table 5.44. In terms of the depreciation method, agricultural firms nowadays use many machines and equipment in their production processes; therefore, they must subject those machines to depreciation. As shown in Table 5.45, all of the interviewees mentioned that their firms use the straight-line method for depreciation. Another benefit of cost information in agricultural firms is in formulating the budget; most of the respondents stated that they rely on the previous year's expenses to estimate the next year's expenses.

Table 5.44
Transfer Pricing

	Respondents	Response
Transfer pricing	1	I am not sure about transfer pricing; although we use some departments' output as other departments' input, the firm does not count the transfer prices.
	2	Yes, we use one department's output as another department's input; for instance, the hay, which is the production department's output, is used as the livestock department's input.
	3	We use hay to feed the livestock but because livestock is not an essential product in the firm, we do not count the cost of hay used to feed the animals.
	4	Actually we do not use any output from any department as input in another department.
	5	Yes, we use the plantation department's output (hay) as input to the livestock department and the livestock department's output (meat) as the service department's input (to prepare the workers' food).
	6	Yes, actually we use some departments' output as other departments' input; however, it is difficult to determine the transfer prices.

Table 5.45
Depreciation Methods

	Respondents	Response
Depreciation methods	1	Straight-line method
	2	Straight-line method
	3	Straight-line method
	4	Straight-line method.
	5	Straight-line method
	6	Straight-line method

The interviewees thought that the use of cost accounting in Libyan agricultural firms is important, because the implementation of CASs will assist them in achieving many objectives, for instance cost control, determining the selling prices, improving the products, using scarce resources in an appropriate way, and taking many managerial decisions. Table 5.46 shows the respondents' opinions about the significance of using CASs in Libyan agricultural firms. Furthermore, as shown in Table 5.47, the interviewees stated that there are some difficulties facing the use of CASs in Libyan agricultural firms; however, they stated that they need qualified accountants and experts to implement CASs in an appropriate way.

Table 5.46
Significance of Cost Accounting Systems in Libyan Agricultural Firms

	Respondents	Responses
The importance of a cost accounting system	1	It is important for cost control, to determine the prices and improve the products.
	2	A cost accounting system is very important in any firm and the decision maker must rely on cost information in making many decisions and cost control.
	3	It is important for agricultural firms in making many decisions.
	4	A cost accounting system is important to agricultural firms, especially nowadays, because many foreign companies invest in the agricultural sector in Libya; therefore, we compete with those firms.
	5	It is important for many reasons, for instance to use scarce resources in a perfect way and to organize the expenses.
	6	I think agricultural firms have to implement cost accounting systems for many reasons, such as cost control and to determine the prices.

Table 5.47

Difficulties Facing Libyan Agricultural Firms in Using Cost Accounting Systems

	Respondents	Response
Difficulties faced by firms in using cost accounting systems	1	The firm needs more accountants.
	2	There are no difficulties in using cost accounting systems in agricultural firms; however, we need cost accountants and experts.
	3	We need qualified accountants to use cost accounting systems in the appropriate way.
	4	There is intervention in the cost between the products, such as some employees work during the working hours in different fields; therefore, it is difficult to determine the labour cost exactly, so we need cost accountants to solve these problems.
	5	Yes, there are some difficulties, such as it is difficult to determine some machines' cost and some cost data need experts.
	6	We need experts in different disciplines to identify the working time for every worker and machine, as well as to determine the time for every operation in every field, to be able to allocate overhead costs.

All of the interviewees stated that their firms use traditional costing, but their firms do not use ABC at all. Moreover, the interviewees stated that their firms do not classify the cost according to any type of categorization. The interviewees stated that water and arable land are scarce resources in Libya and using CASs could lead to these scarce resources being used in an appropriate way. Table 5.48 presents the answers of the interviewees in relation to scarce resources.

Table 5.48
Usefulness of Cost Accounting regarding Scarce Resources

	Respondents	Response
Scarce resources	1	The use of cost accounting will assist the firms in using scarce resources perfectly.
	2	The use of cost accounting systems maintains the scarce resources.
	3	Using a costing system will maintain scarce resources, such as water and land.
	4	Cost accounting systems assist firms to use scarce resources to make sure that they use them in a proper way.
	5	Using cost accounting systems maintains the scarce resources.
	6	Cost accounting helps firms to use scarce resources perfectly.

5.13 Summary

This chapter mainly aimed to gain an understanding of the use of cost accounting systems in Libyan agricultural firms and to examine the relationship between six contingent factors and the use of cost accounting systems. Semi-structured interviews, a questionnaire, and documentation analysis were undertaken to achieve these objectives. Analysing the qualitative data manually showed that most of the Libyan agricultural firms do not have cost accounting departments, most of the Libyan agricultural firms use traditional costing to allocate their overhead costs, the most important purpose of cost information is to determine product prices, and all of the Libyan agricultural firms implement full costing to determine the product cost. SPSS version 18 was used to examine the relationships between the IVs and the DV. Multiple regression indicated that there are four IVs (size, cost structure, importance of cost information, and legal obligation) that have a positive and statistically significant relationship with the DV, whereas two IVs (competition and product diversity) have no relationship with the DV.

CHAPTER SIX
DISCUSSION

6.1 Introduction

The aim of this chapter is to discuss the findings presented in Chapter Five, namely to identify whether Libyan agricultural firms use CASs, to identify the extent of use of CASs in Libyan agricultural firms, to examine the factors that influence the use of CASs in Libyan agricultural firms, to investigate how Libyan agricultural firms allocate overhead costs, and to investigate how Libyan agricultural firms calculate their product costs. Chapter Six discusses the use of CASs in Libyan agricultural firms as well as the relationships between the independent variables (IVs) and the dependent variable (DV).

6.2 The Use of CASs in Libyan Agricultural Firms

The descriptive analysis indicated that traditional CASs are widely used in Libyan agricultural firms, since 52% of the research sample uses traditional CASs, while only 32.6% of the research sample uses innovative CASs; these results are consistent with the previous cost accounting literature related to developing countries. Several studies conducted on developing countries have confirmed that traditional costing is widely used in developing countries (Sulaiman et al., 2004; Maelah & Ibrahim 2006; Abdel-al & Mclellan, 2011; Elhamma, 2012). A lack of research in developing countries might be one of the causes of developing countries' firms' continued reliance on traditional costing, because if there is no new research in the cost accounting area, it is not easy for firms to update their CASs according to innovative costing systems.

Libyan agricultural firms might be using traditional costing because the top management is satisfied with traditional CASs in calculating the costs and allocating the overhead costs. Moreover, the Libyan Government does not require agricultural firms to provide more details about their determination of the product cost. It only asks for total numbers, such as how much the agricultural firms spent on the year's crop and how much every quintal costs, regardless of the way in which the agricultural firms calculate the cost. The cost information, provided by cost units in the Libyan agricultural firms, relies on traditional costing, and it is probably more appropriate for financial reports than for decision making or cost control (Ning, 2005). Moreover, before 2003, when Libya was subjected to economic sanctions by the United Nations, no foreign firms invested in the agricultural sector. Working in a monopolistic environment caused a lack of care about the product cost among Libyan agricultural firms (Aljazawe, 2006).

The reason for this is that firms that do not rely on a low-cost strategy usually use simple CASs due to their ability to sell the products at any price they want (Pavlatos & Paggios, 2009). These findings are supported by Chenhall and Langfield-Smith (1998a), who conducted their study in the manufacturing sector, and Pizzini (2006), who conducted his study in the service sector; they claimed that firms that focus on a low-cost strategy are more likely to implement sophisticated CASs, and Pavlatos and Paggios (2009) found that there is a positive relationship between the low-cost strategy and the use of sophisticated CASs.

This thesis supported Abdel-Al and Mclellan's (2011) study, in which they claimed that manufacturing firms in Egypt use traditional CASs more than the ABC system; only

11% of their study sample implement ABC, while the majority of the respondents claimed that they rely mostly on traditional CASs, because they consider the cost information obtained from traditional cost accounting to be adequate for the Egyptian business environment.

Furthermore, Sulaiman et al. (2004) claimed that most firms in Malaysia, India, China, and Singapore use traditional costing more than contemporary management accounting systems due to a lack of top management support, the high cost accompanying the implementation of a new system, and managers usually avoiding risks in implementing new systems. Likewise, Elhamma (2012) claimed that only 12.9% of Moroccan firms included in his study implement ABC and the rest are most likely to implement traditional costing. Elhamma (2012) suggested that a lack of ABC was due to the firms' size, and he claimed that firms' size influences them to implement ABC. About 52% of his study sample consisted of large firms, while only 48% was made up of SMEs, which meant that there were many large firms in his study sample that did not use the ABC system. On the other hand, in this thesis, the sample consisted of large firms, most of which were implementing traditional costing. However, small firms do not implement ABC, probably due to these firms usually producing just one product. Hence, all the firms' cost will be allocated to that product (Juchau, 1986). Implementing ABC in such cases will involve more costs than benefits that can be accrued.

Even in developed countries, traditional CASs are more popular than advanced CASs, especially in service firms. Pavlatos and Paggios (2009) claimed that the percentage of Greek hotels that implement traditional CASs is greater than the percentage of Greek hotels that use ABC, which could be due to the traditional CASs in the hospitality sector providing sufficient cost information to manage the hotels. Odysseas and Ioannis (2007) found that 76.5% of Greek hotels use traditional costing and 23.5% use ABC. Emmett and Forget (2005) found that only 4.7% of their research sample used ABC, while 71.8% were aware of ABC, but preferred traditional CASs. Szychta (2002) also claimed that in Polish firms, traditional CASs are widely used in manufacturing and service firms and that the majority of Polish firms implement job order costing to calculate the unit cost. Moreover, Polish manufacturing and service firms rely on direct labour hours to allocate indirect costs, which may be due to the entire research sample answering that the main purpose of using CASs is to provide information to prepare financial reports and for tax purposes. Therefore, traditional cost accounting might be enough to achieve these purposes.

Wijewardena and Zoysa (1999) claimed that Japanese firms rarely use the ABC system compared with Australian firms; instead, they rely on the direct labour base to allocate overhead costs. This might be because Japanese firms rely on other innovative CASs instead of ABC, such as TC, which can design quality products and decrease the cost during the design stage (Kachalay, 2012). Perhaps Japanese firms widely use JIT, which assists firms in reducing the cost during the design stage, making continuous improvements, and increasing the product quality (Hopper et al., 1999). As argued by Kachalay (2012), implementing the JIT production system can lead to an efficient inventory management system, since JIT can organize the function of purchasing raw materials, production processes, and selling the products. In addition, Chenhall and Langfield-Smith (1998b) found that manufacturing firms in Australia implement traditional management accounting systems more than modern management accounting systems; however, the adoption rate for advanced management accounting techniques is increasing among Australian firms due to the increasing firm size, which can increase further with the use of the latest production technology and the production of several products that consume different amounts of resources. Therefore, contemporary CASs will be used as a result of the enhanced production technology. For instance, Wijewardena and Zoysa (1999) suggested practising ABC as an appropriate system to allocate overhead costs in firms that use high-tech machines. Although the Libyan agricultural firms' workers claimed that they use CASs, such as traditional costing, to allocate overhead costs, this thesis found that Libyan agricultural firms use inappropriate procedures to allocate overhead costs, since all the indirect costs are allocated to one department.

During the interviews conducted, the participants from Libyan agricultural firms claimed that there is no cost accounting department in their firm, which infers that cost information is more important for financial purposes than for managerial purposes. Only one interviewee claimed that the firm used to have an independent cost department; however, the management combined the cost department with the finance department and the cost department became a unit of the finance department. The findings are consistent with the findings of Hopper et al. (1999), who found that SMEs in Japan combine cost accounts with financial accounts, as do Libyan agricultural firms. However, the interviewees claimed that the agricultural firms in Libya use CASs. The interviewees said that Libyan agricultural firms use full absorption costing to determine the product cost. In addition, one of the interviewees claimed that there are four cost elements in their firms: labour costs (e.g. salaries, wages), production costs (e.g. seeds, fertilizers, pesticide), operation and maintenance costs (e.g. spare parts, oil, electricity, subsistence), and managerial expenses (e.g. stationery, telephones). Besides, the interviewees said that the firms were divided into three cost centres, including a cost centre for plantation production, a cost centre for livestock production, and a cost centre for general expenses.

The documentation collected from some of the Libyan agricultural firms also indicated that they use CASs, because they prepare cost statements for every product separately, such as a cost statement for barley production, a cost statement for wheat production, etc. The cost statement includes all the expenses paid for a specific product during the season, which will facilitate the determination of the product cost at the end of the season, by dividing the total cost of the cultivated area to derive the cost of every acre.

Some of the interviewees said that they allocate overhead costs to only one department, which is the plantation department; they mentioned some justifications for this action, including their firms having one main department (plantation department) and other departments (e.g. livestock) being small departments compared with the main department. Thus, they trace the direct costs to all departments, while the indirect costs are allocated to the main department. Moreover, they argued that it is difficult to determine an indirect cost related to other departments; this action distorts the product cost in the sense that the cost of some products will be overstated (main department products), whereas the cost of other products will be less than the real costs (other departments).

The agricultural business environment in Libya changed after the economic sanctions were removed in the year 2003 (IMF, 2006). This led to several foreign firms investing in different sectors in Libya, including agricultural firms. For instance, in 2006, Italy invested 500,000 euros in the Libyan agricultural sector (EC, 2009), and in 2012, USA agricultural firms invested in the Libyan agricultural sector as well. Libyan agricultural firms have to rely on a low-cost strategy to compete with foreign firms. With the current CASs, it is difficult to set competitive prices, especially since the foreign firms that invested in Libya came from developed countries. These firms probably adopt a low-cost strategy and have more experience in CASs. Using developed production technology in the Libyan agricultural firms should lead to more advanced CASs being used in the Libyan agricultural firms as well. Lee and Kao (2000) found that using the ABC system will help managers to gain competitive advantages, since the ABC system can assist firms in identifying value-added and non-value-added activities. By eliminating non-value-added activities, the firms can reduce their product costs, which will enable the setting of competitive prices that cannot be achieved by traditional costing.

Libyan agricultural firms use cost information mainly for determining the selling prices. This finding supports Noltemeyer (1986), who argued that determining selling prices is considered to be one of the most important roles of CASs. In addition, Uyar (2010) found that Turkish manufacturing firms consider setting product prices to be the most important use of cost information. Three of the respondents claimed that they use cost information in cost control and for determining the product cost as well. However, some of them argued that they use cost information to determine the minimum price and to make comparisons of the year's expenses.

Due to the Libyan Government's subsidies, for some of the agricultural firms, the Libyan Government sometimes determines the agricultural product prices to keep them at reasonable levels. Therefore, CASs, in this case, are used to determine the appropriate product costs to find the difference between the prices set by the Government and the actual costs. If the actual cost is less than the prices set by the Libyan Government, the Government will compensate the agricultural firms by the difference between the cost and the selling price. In this context, one of the interviewees claimed that:

> The Libyan government subsidizes the agricultural product prices, because it wants to keep the prices in a reasonable range, and to assist small producers to continue planting agricultural products, especially barley and wheat, by offering cheap seeds.

According to the accounting literature, CASs have several purposes; for instance, Juchau (1986) claimed that CASs can control the use of scarce resources among organizations to make sure that the best returns are received from using those resources. All the interviewees supported Juchau (1986), since they all argued that water and arable land are considered scarce resources in Libya and the use of CASs will lead to maintaining scarce resources and using them in appropriate ways (Porter & Yergin, 2006). Moreover, firms can benefit from CAS data in several ways, such as decision making, cost management, product pricing, performance evaluation, budgeting and budgetary control, and the preparation of financial statements (Argilés & Slof, 2003; Manalo, 2005; Hannan, 2008). In health care organizations, Janet and Gus (1996) mentioned that CAS information assists firms that work in the health care environment by providing detailed and reliable cost information to help those firms set competitive prices to survive in the competition.

CASs provide decision makers with suitable and reliable information appropriate for the decision-making process. According to Majid and Sulaiman (2008), firms need more accurate overhead cost allocation bases in the present competitive environment, and these can be achieved by implementing ABC. In addition, for the agricultural sector, Argilés and Slof (2001) claimed that CASs in farming can improve farm management, leading to better farm performance, while farm costing is also useful to monitor the plantation expenditures, which increase as farming becomes modernized.

6.3 Extent of CAS Usage in Libyan Agricultural Firms

From the 46 usable questionnaires, constituting an 81% response rate, 24 (52.2%) respondents claimed that they are still using traditional CASs, while 15 (32.6%) confirmed that they practise ABC. On the other hand, 7 (15.2%) claimed that they do not have specific CASs; in other words, they might be using informal CASs or they do not use CASs. This result indicates that 84.8% of the research sample are implementing CASs.

The interviewees' responses contradicted the descriptive analysis related to the implementation of ABC. All the interviewees claimed that they do not use ABC. Most of the interviewees claimed that they do not have any idea about ABC, although four interviewees have a degree in accounting. This may be due to the fact that many graduated in the 1970s and 1980s when ABC was in its infancy. They also did not update their knowledge because most of the Libyan agricultural firms are located far away from cities and it is difficult for their employees to visit libraries. Furthermore, there have not been many conferences related to CASs in agricultural firms in Libya. Attending a related conference is one of the ways in which employees learn about innovative costing systems (Emmett & Forget, 2005). Training and development are important aspects of the implementation of innovative CASs, such as ABC (Quesada-Pineda, 2010). In Libyan agricultural firms, employees are trained in other specialities, such as mechanical training for using new machines. One of the interviewees said:

> Although the agricultural firms in Libya send many employees for training to improve their skills, however, we do not send employees for training in accounting or management areas.

Furthermore, a lack of research about CASs in the agricultural sector, specifically in Libya, caused the accountants' lack of knowledge about innovative cost accounting techniques. Only one interviewee, who graduated in 2009, said that he has an idea about ABC. However, he claimed that his firm uses traditional CASs instead of ABC. The researcher believes that all the respondents who claimed that they implement ABC in their firms did not understand the question, or maybe the result was because 15 (32.6%) of the respondents have degrees in fields other than accounting, management, finance, and economics.

Most of the production managers and some managers in the Libyan agricultural firms have a degree in agricultural science; therefore, it is obvious that they do not have much information about CASs. In addition, 28 (60.9%) have been working in the agricultural firms for more than 10 years, and many of them probably have not studied ABC. Libyan universities, perhaps until the year 2000, did not include ABC in their syllabi. Thus, it is difficult for those employees who graduated before 2000, especially in the 1970s and 1980s, to know what ABC means. Roztocki and Schaltz (2003) conducted their study on firms from developed countries, including firms from Asia, the USA, Canada, Europe, and Latin America; they found that firms that have more than 100 employees (30% accountants and 55% managers) are not familiar with the ABC system, and 64% of the accountants and 84% of the managers in the firms that have fewer than 100 employees are not familiar with the ABC system. Thus, it is not surprising that some firms' employees in developing countries, such as Libya, do not know about ABC. Moreover, a lack of training among employees in the accounting field has distanced accountants from contemporary accounting systems. Furthermore, the researcher believes that the Libyan agricultural firms are satisfied with traditional CASs for calculating the product cost and allocating overhead costs. One interviewee said that:

> The Libyan agricultural firms use the same financial systems since a long time ago. Because ABC is a modern cost accounting system, I do not think it is implemented in the Libyan agricultural firms. Moreover, the employees usually obtain training in technical purposes such as using new machines, maintenance of old machines and when we used computers for the first time, some employees were sent to get training to know how to deal with computers. Even new employees who have a current degree in accounting continue using the same system used in the firm.

6.4 Factors That Influence the Use of CASs in Libyan Agricultural Firms

This thesis conducted a questionnaire survey to explain the relationship between six contingent factors and the use of CASs in Libyan agricultural firms. It examined six hypotheses related to the factors that influence Libyan agricultural firms to use CASs. A total of 57 questionnaires were distributed to management accountants. However, of this number, only 46 questionnaires were returned. This thesis used SPSS version 18 to test the relationship between the six independent variables, specifically the agricultural firm size, cost structure, level of competition, product diversity, legal obligation, and importance of cost information. Of the three alternative significance levels that are available for researchers – 0.01, 0.05, and 0.10 – this thesis used the 0.05 level of significance as the critical level for deciding whether or not the hypotheses are supported. After carrying out all the statistical tests that allowed the researcher to conduct multiple regressions successfully, this thesis produced the following findings.

6.4.1 Size

Objective measurement was used to measure the size, specifically the total revenues. This thesis found that the agricultural firms' size positively and significantly influences the use of CASs. This result indicates that if agricultural firms increase their size, the use of CASs becomes more important, since large agricultural firms are most likely to produce several types of products, which will consume the firms' resources in different proportions; thus, they use CASs to determine every product cost separately. Moreover, large firms are most likely to have many employees, which means that they are more likely to have educated staff to implement CASs.

On the other hand, small firms usually produce one product and employ a small number of staff. Determining the product cost in such firms will be undertaken by using an informal system, as claimed by Obara and Ukapi (2000), who argued that all small firms do not implement CASs because employing accountants will cost them more money and it is easy to determine the product cost for just one product.

The size measurement consists of three groups (between 100,000 and 900,000 Libyan dinars, which is considered as small, between 1 million and 900,000 million Libyan dinars, which is considered as medium, and greater than 10 million Libyan dinars, which is considered as large). A one-way Anova (post-hoc test) was used to identify which one of the three groups influences the use of CASs more. The one-way Anova (post-hoc test) showed that there are no significant differences between the three groups (P = 181), which means that there is no statistically significant difference in the use of CASs between the three groups.

The accounting literature indicated that for firms that produce several products and gain large profits, using CASs is more important to manage their resources appropriately (Juchau, 1986). Thus, the second and third categories are supposed to influence the use of CASs more than the first category. This might be because the entire research sample belongs to the government sector, which means that the firms believe that using CASs is very important; however, because they receive support and subsidies from the Libyan Government, some of them do not use CASs.

This thesis's finding supports the previous literature that argued that firms' size impacts on their use of CASs. For instance, Juchau (1986) claimed that farms' size determines the nature and the scope of their use of CASs. Large agricultural firms that have huge capital and produce many types of products need to use CASs to allocate the resources to the products in an appropriate way and to determine every product cost separately. Juchau's findings are supported by Jack (2008), who found that only large agricultural firms have management accounting systems. On the other hand, in small farms that produce one product, it is easy to determine the product cost and there is no need for sophisticated CASs. Moreover, this result is consistent with Haldma and Lääts's (2002) study findings; they concluded that the implementation of sophisticated CASs tends to increase as a result of the firms' size increasing. This might be due to large firms' top management requiring more detailed cost information, for example cost information for every production line, while medium and small firms require cost information for every department.

Obara and Ukpai (2001) found that firms in informal sectors do not use CASs due to their small size, and they use fewer resources, which can be managed by one employee, so they are most likely to rely on market prices to make pricing decisions. Therefore, Obara and Ukpai posited that firms' size plays a very important role in the implementation of CASs, which the current thesis supports as well. Obara and Ukpai (2001) suggested that the use of CASs in small firms might be more costly than its benefits, especially when small firms produce just one type of product, because determining the cost of the product will be performed by gathering all the costs, divided by the number of products.

It is argued that size does not only influence firms to use CASs, but also determines the level of CAS sophistication, which means that if a firm's size expands, the company will implement a more sophisticated CAS. This finding is supported by Al-Omiri and Drury (2007), who claimed that the relationship between the firms' size and a higher level of cost system sophistication is positive and significant. Likewise, Roztocki and Schaltz (2003) concluded that the firm size is one of the determinants of firms' implementation of sophisticated CASs, such as ABC. In addition, Abdel-Kader and Luther (2008) found that firms' size is one of the most important factors that cause firms to use management accounting, the justification being that larger firms have more resources, so they adopt more sophisticated management accounting systems than smaller firms. Abdel-Kader and Luther (2008) empirically found that there was a relationship between the firm size and the adoption of sophisticated management accounting systems. The relationship between the firms' size and the use of CASs is positive because most large firms use high-tech machines to produce different types of products and the overhead costs are high. Implementing CASs is necessary to allocate overhead costs to the products and determine every product cost separately (Brierley, 2011).

Likewise, service sector firms are influenced by their size in their use of CASs. Hill (2000) and Roztocki and Schultz (2003) claimed that there is a significant relationship between firms' size and their implementation of ABC. Large firms produce multiple services or products, while the consumption of their resources differs among the products; traditional CASs will distort the product cost, while ABC will allocate indirect costs appropriately.

On the other hand, some studies contradicted what this thesis found, such as Emmett and Forget (2005), who conducted a study to learn how hospitals utilize the ABC system, using four factors, namely hospitals' size, profit status, membership of chains, and location. Emmett and Forget (2005) found that only location influences hospitals' implementation of ABC as compared with the other factors. This means that hospitals' size does not influence their usage of ABC, probably because the demand for health care services in rural areas is higher than the supply.

6.4.2 Level of Competition

This thesis found that there is a positive relationship between the level of competition and the use of CASs in Libyan agricultural firms; however, the relationship between them was not statistically significant at the 0.05 significant level, since P = 0.06; if this thesis used 0.10 as the significance level, the relationship between the two variables would be statistically significant. Competition was measured by four items: competition with other agricultural firms, increased competition for the products the firm produces, price competition, and market competition.

For firms that face a high level of competition with other companies, it is preferable to produce low-cost products to be able to sell them in the markets; this cannot happen without accurate and timely cost information, and the overhead costs should be allocated appropriately to prevent overstated costs, or minimization in product costs, to assist firms in setting competitive prices. Therefore, implementing CASs will provide helpful cost information to assist firms to allocate overheads accurately and to set competitive prices. This opinion is supported by Hume-Schwarz (2007), who stated that because of the previous lack of competition, decision makers were able to make decisions about profit margins by gathering the total costs and dividing them by the products and then adding the profit margin that they wanted. However, this is not the case with increased competition, as firms cannot set arbitrary prices as before. Firms should set prices no higher than counterpart product prices in the market, and these prices should not be less than the product cost to be able to survive with other competitors.

This thesis's finding did not support most of the previous studies that indicated that the level of competition is one of the external factors that influences firms to implement CASs, which might be because agricultural products are very important for human beings. They rely on agricultural products to feed themselves, leading to the demand for such products being greater than the supply, or this may be because agricultural products can be used for other products as raw materials.

Several studies reported that the level of competition motivates firms to use CASs; for instance, Uyar (2010) found that the increased level of competition is one of the factors that influence Turkish firms to use CASs. Hill (2000) claimed that there is a positive relationship between the use of CASs and the level of competition faced by firms; however, even the choice of which CASs should be implemented is influenced by the level of competition. Karmarkar et al. (1989) concluded that selecting the appropriate CASs is dependent on the competition faced by the firms, the importance of the overheads, and the stability of the production process. Moreover, increasing the level of competition will lead to increasing the CASs' sophistication, such as the use of ABC instead traditional costing. Greater intensity of competition will lead to more timely and detailed cost data being required to make pricing decisions, and these cannot be achieved without implementing more advanced CASs (Al-Omiri & Drury, 2007).

Ning (2005) looked further than the use of CASs; he suggested that the intensity of competition was one of the factors that led to the development of CASs in the USA. When firms worked in monopolistic markets, they produced commodities and sold them at any price they wanted, so calculating the product cost was not important. The changing markets and increased level of competition between firms made decision makers ponder how they could increase their sales in the markets to be able to achieve profits to survive. This led firms to decrease their products' prices and determine their products' cost appropriately to make sure that the prices set by the decision makers covered the cost and achieved the targeted profit margin (Edwards & Newell, 1991).

On the other hand, this thesis supported several studies; for instance, Bjørnenak (1997) studied the relationship between the level of competition and the adoption of one CAS, namely ABC. Previous studies had indicated that an increased level of competition influences firms to adopt the ABC system (Karmarkar et al., 1989). Bjørnenak (1997) claimed that there is no relationship between the level of competition and the use of ABC, because most non-adopters of ABC have a higher number of competitors and export rate than ABC adopters. Furthermore, Pavlatos and Paggios (2009) concluded that the level of competition does not influence CASs' functionality in firms. Pavlatos and Paggios (2009) claimed that their findings contradict the prior literature, perhaps due to the sample being quite small or the questionnaire used, so the sample measurements could not take into account the appropriate ways in which the level of competition influences the cost system functionality.

6.4.3 Product Diversity

To measure the product diversity, the researcher used four items: diversity in products, diversity in production processes, differences in outputs, and diversity in resource consumption. The result showed that the relationship between the product diversity and the use of CASs is negative. That means when Libyan agricultural firms produce different types of products, implementing CASs becomes less important. Most of the prior literature argued that product diversity is one of the most important factors that influence firms to use CASs, especially regarding the allocation of the firms' resources to different types of products (Abernethy et al., 2001). This thesis does not support the hypothesis that suggested that there is a positive relationship between the product diversity and the use of CASs in Libyan agricultural firms.

The previous literature showed that product diversity is considered to be the major factor causing cost distortions in traditional CASs, because the products consume different proportions of resources (Bjørnenak, 1997; Tayles & Drury, 2003). However, the current thesis's results completely contradict those of the previous studies, such as Juchau (1986), who suggested that agricultural firms that produce several products need to implement CASs to allocate their resources appropriately and to determine every product cost separately. This thesis's findings probably contradict the prior literature because most of the prior studies, other than Juchau (1986), were conducted on manufacturing and service firms in developed countries.

Moreover, the research sample belongs to the government sector. Geiger and Ittner (1996) suggested that most government sector firms are most likely to use CASs only for external requirements and not for internal use. The Libyan Government does not request detailed cost information from agricultural firms; the only important thing for the Libyan Government is the total numbers, such as how the firm spent the money and how much money those firms have made.

In small agricultural firms that produce one product, it is easy to determine the product cost and there is no need for sophisticated CASs. Cooper and Kaplan (1988) and Carenys and Sales (2008) claimed that firms that produce several products should implement sophisticated CASs if they want to determine the cost of every product appropriately. Similarly, Abernethy et al. (2001) and Tayles and Drury (2003) claimed that greater product diversity needs more sophisticated CASs to determine the variation in resource consumption by different products. They stated that there is a positive relationship between the product diversity and the choice of costing systems, which means that if firms have a low level of product diversity, they usually choose a low level of costing system sophistication, and vice versa. This finding is supported by Malmi (1999) and Schoute (2009), who claimed that product diversity is positively associated with the use of ABC.

Product diversity is an important variable that influences the use of ABC, because the more complicated production process and production of different types of products need more complex CASs (Carenys & Sales, 2008). The implementation of traditional CASs in firms producing several types of products has been severely criticized, for example the arbitrary allocation of overhead costs that will lead to the distortion of product costs and the use of volume-based allocation systems, such as direct hours or cultivated area.

Using traditional costing to allocate overhead costs leads to the overstatement of costs for some products that consume fewer indirect costs and reduced costs for some products that consume more indirect costs. Furthermore, relying on traditional cost accounting information will lead to inappropriate managerial decisions, such as in pricing and cost control (Kachalay, 2012).

In the literature, product diversity is considered to be one of the dominant factors that influence firms to use sophisticated CASs. Bjørnenak (1997) found that the product diversity does not influence business organizations to implement ABC. Likewise, Al-Omiri and Drury's (2007) study found that there was no relationship between the product diversity and the cost system sophistication, maybe because the measurements were too simple to test the relationship between the product diversity and the use of sophisticated CASs.

6.4.4 Cost Structure

Objective measurement was used to measure the cost structure, specifically the percentage of direct costs and indirect costs of the total cost. This thesis found that there is a positive and statistically significant relationship between the cost structure and the use of cost accounting in Libyan agricultural firms.

When the business environment moved from labour-intensive to machine-intensive, the cost structure changed as well. The increasing overhead costs as a result of the changed cost structure led to the importance of implementing innovative CASs to control all the activities that add value to the product. As indicated by Lukka and Granlund (1996), the cost structure is an important variable that influences the use of costing methods. Similarly, Malmi (1999) and Tayles and Drury (2003) found that the percentage of indirect costs does not just make firms use CASs, but also makes them choose either traditional costing or ABC. If the percentage of direct costs in the total costs is high, it is preferable for firms to implement a simple CAS; however, if the indirect costs are larger than the direct costs, in this case, it is advisable for firms to apply advanced CASs because traditional CASs will distort the product costs (Cooper & Kaplan, 1988).

The cost structure's measurement consists of five groups (the balanced category, 50% direct costs and 50% indirect costs, and unbalanced categories consisting of 60% direct costs and 40% indirect costs, 70% direct costs and 30% indirect costs, 80% direct costs and 20% indirect costs, and 90% direct costs and 10% indirect costs). A one-way Anova (post-hoc test) was used to identify which one of the five groups influences the use of CASs more. The one-way Anova (post-hoc test) showed that there are no significant differences between the three groups ($P = .808$). That means that there are no statistically significant differences in the use of CASs between the five groups.

For firms that have high indirect costs in their total costs, the use of CASs is more important than for firms that have high direct costs in their total costs (Lukka & Granlund, 1996). Other researchers have argued that firms with high indirect costs are supposed to use innovative CASs, such as ABC (Tayles & Drury, 2003). The one-way Anova (post-hoc test) indicated that there were no statistical differences between the five groups, meaning that all five groups think that using CASs is important for their firms.

This finding might be because of the sample size being quite small, consisting of only 46 usable questionnaires.

This thesis's finding supports Bjørnenak's (1997) study, which found that of the four contingent factors studied in his research, only the cost structure was statistically significantly related to the adoption of ABC. Bjørnenak (1997) claimed that firms that have a high percentage of indirect costs in their cost structure adopt ABC more than companies that do not. Most of the studies conducted in management accounting research indicated that the cost structure plays an important role in implementing CASs; some other researchers have argued that the cost structure influences firms to use more sophisticated CASs, such as Brierley et al. (2001b), who concluded that the cost structure determines whether firms choose to use sophisticated costing or not.

For instance, if the indirect costs are low in an industry, there is no need to invest in sophisticated CASs (Owler & Brown, 1965), whereas if the indirect costs constitute a high percentage of the total costs due to the use of high-tech machines to produce a variety of products, sophisticated costing systems need to be used, because different types of products usually consume different proportions of firms' resources. In such cases, the ABC system is advisable because traditional costing using volume bases such as direct labour hours or direct machine hours will lead to the distortion of the product costs; for instance, some products need fewer machine hours but consume more overhead costs (Cooper & Kaplan, 1988).

Likewise, Karmarkar et al. (1989) found that the choice of CASs is dependent on many factors, such as the significance of overhead costs. The literature indicated that the percentage of indirect costs among firms makes decision makers choose traditional cost accounting or ABC, whereas if the overhead costs' percentage is low, only traditional cost accounting is appropriate. If the percentage of overhead costs is high, the ABC system is more suitable for the firm, especially if the firm produces several types of products (Carenys & Sales, 2008), to which overhead costs can be allocated in an appropriate way to make appropriate managerial decisions, such as pricing and product mix (Kachalay, 2012).

6.4.5 Importance of Cost Information

To measure the importance of cost information, the researcher used four items: the importance of cost information to assist the agricultural firms to compete with other firms, the need to reduce the cost, making pricing decisions, and producing different accounting reports. This thesis found that the hypothesis is supported as there is a positive relationship between the importance of cost information and the use of CASs in the Libyan agricultural firms. This result is consistent with the available literature; if the firms work in a competitive environment or if the firms transformed from producing one product to producing various products, they will seek cost information to be able to survive or to gain the targeted profits.

Other researchers found that the importance of cost information led to the advent of CASs, such as Garner (1947), who stated that when the domestic system of manufacturing was developed at the end of the eighteenth century, by gathering the artisans under one roof because of the increased market demand for more goods and the need to minimize the transaction costs, these changes led to an increase in the importance of cost information. Therefore, at that time, firms increased their demand for cost control. Similarly, Ning (2005) concluded that the need for cost information was to overcome the changes that occurred in product markets, production technology, and demand for control, which necessitated CASs.

The importance of cost information forces firms to use more sophisticated CASs. This means that if the cost information becomes more important, the firms should implement sophisticated CASs to cope with their management's need to make appropriate decisions. This was what Al-Omiri and Drury (2007) found in their study, in which they claimed that there is a positive relationship between the importance of cost information and the use of sophisticated CASs. On the other hand, the need for cost information determines which CAS should be used. For instance, Swenson and Cassidy (1993) concluded that half of the companies in their research sample converted from job order costing to process costing when they implemented JIT, because process costing is more appropriate for JIT.

On the other hand, if the firms are small, do not have stock, buy intermediate products from the markets, and are run by one or two workers, the cost information will not be important; therefore, small firms do not usually use CASs because they can determine their product cost easily using the market prices for raw materials and intermediate products (Juchau, 1986; Obara & Ukpai, 2001).

6.4.6 Legal Obligation

To measure the legal obligation, the researcher used three items: the connection between the performance and the subsidy, the publishing of financial reports, and being subject to income tax. This thesis found that there is a positive relationship between the legal obligation and the use of cost accounting in Libyan agricultural firms. Furthermore, the relationship between the variables was found to be statistically significant at the selected 0.05 significance level.

This finding indicated that government decisions have a great impact on the firms in the government sector to use CASs. If the Libyan Government set several pieces of legislation to implement CASs, this would make all government firms use CASs. This thesis confirms that firms in the government sector may be using CASs because they are subject to government control. However, sometimes firms that belong to the government sector use CASs only for financial use and not for managerial use, specifically to prepare financial reports (Geiger & Ittner, 1996; Salleh, Aziz, & Baker, 2012).

On the other hand, several studies have indicated that if there is no legal obligation, most governmental firms will not implement CASs, such as Argilés and Slof (2003) and Athanasios et al. (2010), who claimed that European farmers do not publish financial statements because of a lack of legal obligation, and this finding was supported by Argilés and Slof (2003) as well. This thesis's finding supported Aljazawe's (2006) study, in which he asserted that the agricultural firms in Libya are large firms and they produce several types of products, but they also face competition from foreign companies. However, they depend on simple cost information for decision making, which means that the agricultural firms in Libya use CASs just to fulfil the Government's requirements.

6.5 Overhead Cost Allocation

Horngren et al. (2009) defined overhead costs as costs common to more than one cost unit and cannot be linked to particular cost unit. Thus, overhead costs are those costs that cannot be traced directly to a cost unit. Overhead costs are the total of indirect material costs, indirect labour costs, and indirect expenses. To determine the product cost accurately, overhead costs ought to be calculated appropriately and then allocated to the cost units in a suitable way (Juchau, 1986; Kachalay, 2012), using one of the allocation methods, either traditional costing or ABC.

Most Libyan agricultural firms produce more than one product. The documentation collected indicated that there are overhead costs in Libyan agricultural firms, including indirect labour costs (salaries, living, and food for workers, social insurance, and travelling expenses), operating and maintenance expense costs (oil, spare parts, depreciation, and maintenance), and other expenses (stationery, telephones, post, rent, insurance, and tax). Although overhead costs should be allocated to all products (Brierley, 2011), most of the interviewees claimed that they allocate overhead costs to one department, namely the plantation department, ignoring other departments, such as the livestock department. The interviewees justified this behaviour by stating that they regard the plantation department as the main activity in their agricultural firms. For instance, in Mknusha agricultural firm's expenditure statement in 2011, 88% of the expenditures were spent on the plantation department and 12% on the livestock department. All of the interviews were conducted in Libyan agricultural firms that produce cereals as their main products while livestock are considered as a sub-department; the results might have been different if the interviews had been conducted in agricultural firms in which the main department is livestock while the plantation department is considered as a sub-department.

This behaviour might not influence Libyan agricultural firms' performance in a monopolistic environment, because those firms can sell their products at any price; however, after the economic sanctions were cancelled by the United Nations in 2003, several foreign firms began investing in the Libyan agricultural sector, which meant that the Libyan agricultural firms ought to set competitive prices to be able to survive in the competition with foreign firms, especially since most of the foreign firms belonged to developed countries, such as Italy and the USA.

Therefore, it is preferable to allocate overhead costs to products in an appropriate way, especially if the overhead costs constitute a high percentage of the total costs. On the other hand, using traditional costing to allocate overhead costs will lead to unsuitable decisions in terms of product costing, since distributing overhead costs to products in an inappropriate way will lead to an increase in some products' costs that consume a low proportion of the overhead costs and a decrease in other products' costs that consume a high proportion of the overhead costs; thus, the cost information provided by the CAS will be inappropriate for decision making (Kachalay, 2012).

Using the ABC system that relies on activities instead of volume-based costing will enable the overhead costs to be allocated accurately (Carli & Canavari, 2013); the products will create the activities and the activities will consume the resources. In this case, the relationship between the product and the overhead costs will be clear, because all the costs of the activities that are used to produce the product will be allocated to that product.

Libyan agricultural firms rely on volume-based measures (e.g. cultivated area) to allocate indirect costs to the products; they use the cultivated area to allocate overhead costs to plantation products, while livestock products are loaded only by direct costs. The researcher believes that foreign firms investing in the Libyan agricultural sector increase the competition between the local and the foreign firms; therefore, Libyan agricultural firms need to implement CASs in an appropriate way to set competitive prices, especially for those products that cannot be kept for a long time or that are expensive to store. Decreased product costs assist firms in setting competitive prices by allocating overheads appropriately, as every product will be loaded by its own overhead costs.

Although the literature explained that ABC is suitable for farming activities, all of the respondents stated that they use traditional costing. Therefore, the researcher recommends the use of the ABC framework to allocate indirect costs in Libyan agricultural firms, as suggested in Figure 6.1.

Figure 6.1 provides an example of departments and sub-departments, because departments can differ from one firm to another. In the same firm, products can also differ from one season to another. For instance, if a firm planted potatoes in 2011, potatoes will be one of the products in the season 2011; however, if potatoes were excluded from the production in 2012, they will not be one of the products. Moreover, some agricultural firms produce only field crops, meaning that these firms do not have a livestock department. Other firms may produce only livestock products, meaning that plantation departments do not exist. Therefore, Figure 6.1 is a guideline to allocating indirect costs in Libyan agricultural firms.

The first stage starts with identifying the activities and proper cost drivers to allocate the indirect costs from the firm resources to the main departments (the plantation department and the livestock department), the second stage starts with identifying the activities and proper cost drivers to allocate indirect costs from the main departments to the sub-departments, for instance, in the plantation department, there are three sub-departments, vegetable, fruits, and cereals, and the third stage starts with identifying the activities and proper cost drivers to allocate indirect costs from the sub-departments to the products.

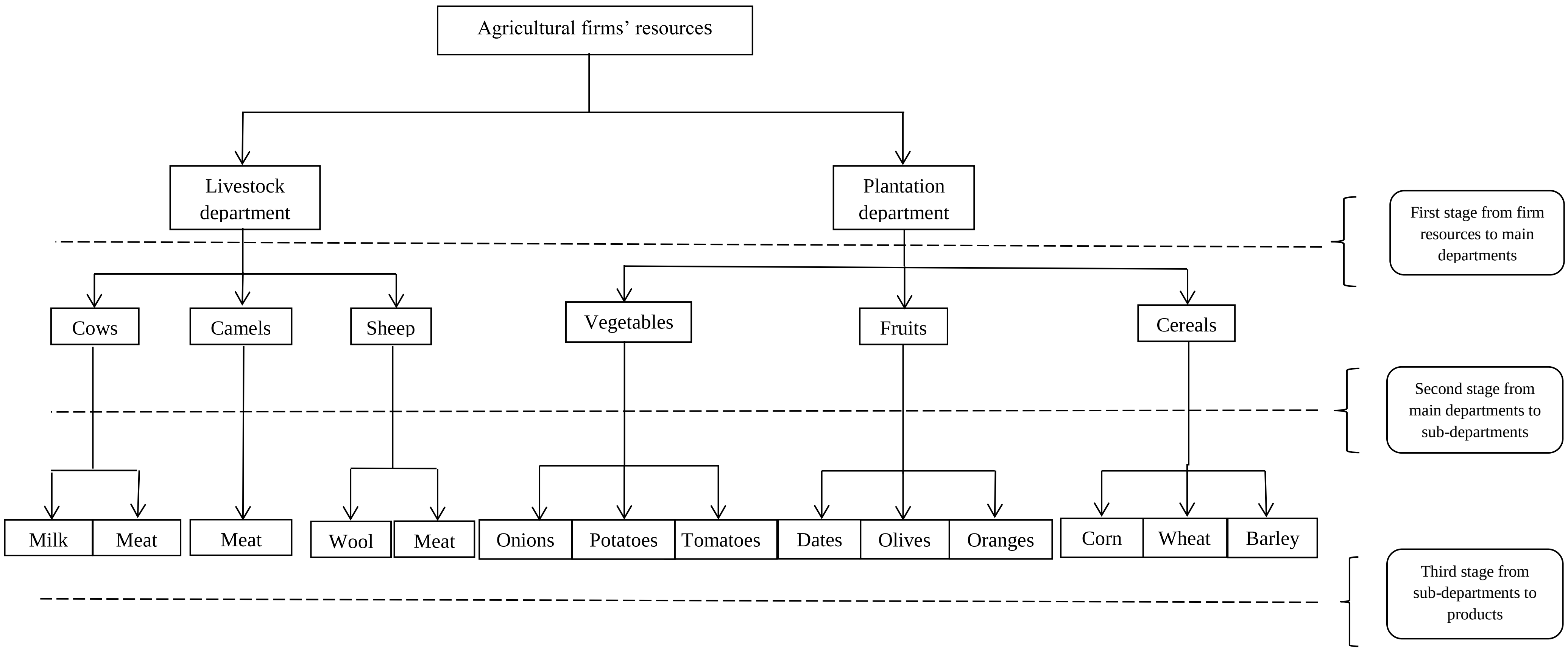

Figure 6.1
Suggested Framework for the Implementation of ABC

This framework is the outline of the ABC system because agricultural firms differ from each other in terms of production types. Therefore, to identify the activities, cost pools, allocation bases, and cost drivers, case studies must be conducted for every firm separately, and a team comprising a variety of occupations (e.g. accountants, production managers, distribution managers, and design managers) should work together to implement ABC correctly.

The ABC approach involves the activities that create the cost during production processes being connected with specific cost objects; therefore, to determine the product costs properly, the indirect costs should be allocated to the products that have benefited from them. From the interviews conducted in Libyan agricultural firms, it was found that most of them allocate the indirect costs to the plantation department, because this department is considered as the main department, whereas other departments bear only direct costs.

For instance, under the cereals department, there are three products – barley, wheat, and corn; every product will be considered as a cost pool, and all the costs will be gathered for every product separately to determine the product cost precisely, to be able to set competitive and profitable prices. Agricultural firms produce cereals through several processes, and every process has its own costs; to allocate the indirect costs to cost pools, the appropriate cost drivers need to be identified for each activity. The direct costs will be traced to those products and the indirect costs will be allocated to those products on a proper allocation basis.

Six processes are used to produce cereals: the processes start with maintenance, the second process is tilling, the third process is sowing, the fourth process is watering, fertilizing, and pest control, the fifth process is harvesting, and the sixth process is cleaning, filling, and packaging. To determine the total cost for every product, the direct costs will be traced to the products that consumed those costs because there is a direct relationship between a product and a cost, whereas indirect costs should be allocated to the products. To allocate the indirect costs to the products, the accountants in Libyan agricultural firms should follow four steps: first, identifying the total indirect cost that is related to a specific process (e.g. maintenance), second, identifying the proper cost drivers that will be used as a base to allocate the indirect costs to the products (e.g. direct labour hours), third, determining the indirect costs that are related to every product individually, and fourth, allocating the indirect costs to the products to determine the product costs, which will include indirect costs plus direct costs.

6.6 Determining the Product Costs

Firms in all sectors need to determine the product cost to make several decisions, such as determining the selling prices and analysing the product's profitability. Determining the product cost in an inappropriate way will lead to unsuitable managerial decisions (Kachalay, 2012), which will influence the firm's performance (Toluyemi, 1999). For instance, for pricing decisions, the product cost should be determined accurately, because the profit margin relies mostly on the product cost. The Libyan agricultural firms set the product prices according to the total product cost, plus 10% as the profit margin (H. Bawa, personal communication, 1 January 2012). However, if the product cost for 1 kilogram of barley is 5 dinars, the selling price for 1 kg of barley should be 5.5 dinars. If firms determine the product cost in an inappropriate way, the price will be overstated. Firms change from traditional costing to the ABC system to allocate overhead costs, to determine the product cost more accurately (Lee & Kao, 2000), and then to set competitive prices to be able to survive in a competitive environment.

Despite the criticism that faces full costing in terms of the managers not being responsible for all the departments' costs because those costs include common costs, if the firm uses a low capacity the product cost will be very high because the products will be loaded by all the costs, including the ideal capacity (Lorenz & Brehm, 1989). The interviewees said that the Libyan agricultural firms rely on full costing to determine the product cost, and they explained that there are four cost elements in their firms: labour cost, production requirements cost, operation and maintenance cost, and managerial expenses. This finding is supported by the documents collected from the Libyan agricultural firms. Using variable costing will overcome the shortcomings of full costing, since variable costing will trace only the variable costs to the products. Furthermore, variable costing facilitates the setting of minimum prices, which will include only variable costs.

It is not surprising that traditional costing is used by firms that receive subsidies from the Government, because the accounting literature included studies that support the current thesis's findings. For instance, Cropper and Drury (1996) found that 35% of the universities in the UK are practising full costing to determine the commercial products' cost. Even firms that receive a subsidy from the Government need to use CASs to control their expenditure (Tahir et al., 2004). Furthermore, using functional CASs in the agricultural firms will lead to enhanced performance (Juchau, 1986; Foong & Teruki, 2009).

The agricultural departments in the Libyan agricultural firms are interrelated; some of the plantation departments' output (e.g. hay) fills production requirements in other departments (e.g. livestock department) to feed sheep, cows, etc. The livestock departments' output (meat) is used to prepare workers' food for all the departments in the firms (H. Al-Zedani, personal communication, 17 August 2010). Determining the product cost for every product appropriately will assist the Libyan agricultural firms in determining the transfer prices between the departments; in the end, the final product costs will be determined appropriately.

However, the Libyan agricultural firms determine the product costs according to how many products the firm produces; if firms produce just one product, it is easy to determine the product cost. For instance, if firms produce only wheat, to identify the quintals of wheat, they gather all of these expenses and then divide them by the cultivated area to determine the acre cost, and to determine the quintal cost, they divide the acre cost by the acre's productivity. In 1996, the acre productivity was 6 quintals (General People's Committee for Agriculture, Livestock and Marine, 2012). If a firm cultivates 1,000 acres of barley and the total cost is 300,000 dinars, the decision makers determine the acre cost using this formula: 300,000 dinars / 1000 acres = 300 dinars: every acre costs 300 dinars. To determine the quintal cost (100 kg), they divide the acre cost by the acre productivity - the quintal cost will be 300 dinars / 6 quintals = 50 dinars (A. Alsalheen, personal communication, 3 March 2012).

If firms produce more than one product (barley and wheat), the interviewees stated that they use the cultivated area as well. If a firm cultivates 1,000 acres (700 acres of barley, 300 acres of wheat), and the total cost is 300,000 dinars, the decision makers use the percentage to determine every product cost separately. First of all, they work out the percentage of every product from the cultivated area as follows: for barley (1,000 acres / 700 acres × 100 = 70%) and for wheat (1,000 acres / 300 acres × 100 = 30%). The barley cost will be 70% of the total cost of 300,000 dinars, which will be 210,000 dinars, whereas the wheat cost will be 30% of the total cost of 300,000 dinars, which will be 90,000 dinars. However, if the firm produces different types of products, not just grain, for instance, grain, vegetables, fruits, and livestock, the interviewees said that it will be difficult to determine the product costs appropriately, especially the overhead costs, because the workers and the machines serve all the crops at the same time, while the harvesting time is different. Therefore, they stated that all the overheads are allocated to essential activity (usually grain). One of the interviewees said that they do not determine the product cost, and to set the product price, they rely on market prices or sometimes the Government sets the prices; these kinds of firms are usually fully or partially supported by the Government.

On the other hand, because of the civil war in 2011, the researcher could not collect many documents, due to some documents having been stolen and burned;

however, some important documents were collected from different agricultural firms and the Libyan agricultural ministry, including lists of Libyan agricultural firms, the expenditure statement for Mknusha agricultural firm for the year 2011, the Barjuj agricultural firm's organizational structure, and cost statements for different products, including corn, wheat, and barley, for the years 1998, 1999, and 2000. All of the documents collected support the assertion that Libyan agricultural firms use CASs.

6.7 Summary

This chapter discussed the findings from the interviews and questionnaire analysis, to understand the use of CASs, in relation to identifying whether Libyan agricultural firms use cost accounting systems, identifying the extent of use of cost accounting systems in Libyan agricultural firms, examining the factors that influence the use of cost accounting systems in Libyan agricultural firms, investigating how Libyan agricultural firms allocate overhead costs, and investigating how Libyan agricultural firms calculate their product costs. This thesis found that traditional costing is widely used in Libyan agricultural firms. Four factors were found to influence significantly the use of CASs in Libyan agricultural firms: the size, cost structure, importance of cost information, and legal obligation. Full costing is used by the majority of Libyan agricultural firms to calculate the product cost.

CHAPTER SEVEN
CONCLUSION

7.1 Introduction

This chapter concludes by presenting an overview of this thesis, the research contributions, theoretical contributions, methodological contributions, and practical contributions. Chapter seven also discusses the limitation of the thesis and makes recommendations for future studies.

7.2 Overview of the Study

CASs are important tools that serve decision makers in all business organizations, especially those firms that produce several products or work in a competitive environment (Juchau, 1986; Carenys & Sales, 2008). The implementation of CASs in the Libyan agricultural firms in the government sector is necessary, because agricultural firms in Libya produce several types of products, they face competition from foreign firms, there is a need to manage scarce resources, and the use of high-tech machines in agricultural production has changed the cost structure – all these factors have increased the need for cost information to help make various managerial decisions in an appropriate way.

Determining the product cost requires appropriate CASs to trace the direct costs and allocate the indirect costs (Blocker & Weltmer, 1954), to enable firms to compete with foreign firms in national and international markets. Moreover, it is preferable to produce low-cost products that will lead to competitive prices, to cover the production cost and profit margin needed by the firms. However, until now CASs in the government sector have mostly been used for financial reports (Salleh et al., 2012), especially in firms that receive a full subsidy from the Government, because workers will receive their salaries regardless of whether the firm achieves profits or losses. Cropper and Drury (1996) also found that UK universities that receive a subsidy from the Government use traditional costing, although 27% of their research sample believed that the ABC system is more appropriate for UK universities than traditional costing. Therefore, the Libyan agricultural firms that do not receive subsidies from the Government ought to pay more attention to using CASs than those firms that do receive subsidies.

The Government provides the agricultural firms that receive subsidies with almost all their production requirements and the employees' salaries come from the agricultural ministry. Therefore, the CASs in those firms are merely used for preparing financial reports because there is no motivation to increase the profits and the Government will support them in the case that they cannot sell the products. On the other hand, the Libyan agricultural firms that are independent have to provide all their production requirements and cover their production costs; therefore, the appropriate use of CASs is necessary. The decision makers in those firms ought to make appropriate decisions to be able to cover the production costs and profit margins and to set competitive prices to facilitate the sale of the products in the markets as soon as possible, especially for those products that cannot be kept for a long time or for which storage will cost more money, such as some vegetables, like tomatoes.

The cost accounting literature indicates that most of the studies related to the use of CASs were conducted on manufacturing firms, because some researchers believe that CASs have emerged as a result of the development of the manufacturing sector (Ittner & Larcker, 2002; Hume-Schwarz, 2007). Other accounting researchers focused their studies on service firms; however, manufacturing firms gained the attention of the majority of accounting researchers. Although the agricultural sector is important for almost all countries, the accounting studies related to the implementation of CASs in the agricultural sector are very scarce, especially in developing countries. This thesis attempted to fill the gap in the accounting literature by studying the use of CASs in agricultural firms, particularly Libyan agricultural firms.

This thesis was primarily undertaken to provide an answer to the main question: How do Libyan agricultural firms use cost accounting systems? To facilitate the answering of the main question, five sub-questions were set, namely: (1) Do agricultural firms use CASs? (2) To what extent do agricultural firms use CASs? (3) Which factors influence the use of CASs in Libyan agricultural firms? (4) How do agricultural firms in Libya allocate overhead costs to their products? (5) How do agricultural firms in Libya calculate their product costs?

This thesis used mixed methods to achieve one main objective and five sub-objectives. The main objective was to understand the use of cost accounting systems in Libyan agricultural firms; the sub-objectives were: (1) To identify whether Libyan agricultural firms use cost accounting systems, (2) to identify the extent of use of cost accounting systems in Libyan agricultural firms, (3) to examine the factors that influence the use of cost accounting systems in Libyan agricultural firms, (4) to investigate how Libyan agricultural firms allocate overhead costs, and (5) to investigate how Libyan agricultural firms calculate their product costs.

Face-to-face interviews were conducted with six persons in different fields, including management accountants, financial accountants, and production managers, to understand the use of CASs in Libyan agricultural firms. The data collected by the interviewer were analysed manually, following several steps, including organizing the data for every respondent, then classifying the data according to the questions, and finally comparing the respondents' answers and writing the report.

In this thesis, the variables' measurements were adopted from prior studies, except one variable, for which the measurements were developed by the researcher. Reliability and validity tests were conducted for all the measurements to ensure that they were appropriate to measure the variables. Of the 57 questionnaires distributed by hand to 57 agricultural firms belonging to the Libyan government sector (to management accountants), 46 usable questionnaires were returned. This thesis relied on SPSS software version 18 to analyse the quantitative data, using several statistical tests. The first test was to check the response rate, which was quite high (81%), and descriptive analysis was used to describe the categorical and continuous data. The data were screened to ensure that there were no missing data or outliers. Exploratory factor analysis was conducted to assess the measurements' validity, and reliability tests were conducted to assess the internal consistency of the measures relying on Cronbach's alpha. Finally, multiple regressions were used to test the research hypotheses.

This thesis found that Libyan agricultural firms are using CASs. The interviewees said that traditional costing is widely used in the Libyan agricultural firms. It is possible that the top management in the Libyan agricultural firms is satisfied with traditional costing information. The interviewees stated that the cultivated area is the most widely used allocation base in the Libyan agricultural firms to allocate overhead costs to the plantation products; because the plantation department is the main department and consumes the majority of the firms' resources, the indirect costs are allocated to it, ignoring other departments, such as the livestock department.

Moreover, the agricultural firms in Libya are divided into three cost centres: a cost centre for plantation production, a cost centre for livestock, and a cost centre for general and administrative expenses (M. Shmasa, personal communication, 26 & 27 February 2012). The final products in plantation departments are considered as a cost unit; for instance, quintals of barley and wheat are the cost unit for cereal production, while a head of animals is the cost unit in the livestock department.

The full costing system is used by almost all Libyan agricultural firms to determine the product costs. Due to the removal of the economic sanctions in 2003 (IMF, 2006), many foreign firms started investing in the agricultural sector. This meant that the level of competition increased among the agricultural firms, and relying on traditional costing would not provide appropriate cost information in a competitive environment, especially since the agricultural firms nowadays are more dependent on machines to accomplish many production processes. This means that the cost structure has changed, since the overhead costs have increased and the direct costs decreased. Advanced CASs are needed to allocate the overhead costs appropriately, to decrease the product cost, and to set competitive prices (Wijewardena & Zoysa, 1999).

The descriptive analysis indicated that 52.2% of the Libyan agricultural firms are practising traditional cost accounting, 32.6% are practising ABC, and 15.2% stated that they do not have specific CASs. This means that 84.8% of Libyan agricultural firms are using CASs. Libyan agricultural firms use the cost information mainly for setting their selling prices and determining their product cost. Although most of the interviewees stated that CASs are important for managing scarce resources, none of the interviewees stated that CASs were applied in their firms to use scarce resources in an appropriate way.

It is argued that overhead costs are considered to be the cause of product cost distortion (Wijewardena & Zoysa, 1999), especially when the total costs include a high percentage of indirect costs as a result of using machines in production processes. Furthermore, if the firm produces several types of products, whereby different types of products consume different proportions of the firm resources, allocating indirect costs to the appropriate products that consume the resources will facilitate appropriate managerial decisions, such as pricing decisions (Kachalay, 2012). In the Libyan agricultural firms, overhead costs are allocated to the main department, that is, the plantation department, whereas other departments are loaded only by the direct cost. The interviewees said that the main department consumes the majority of the firms' resources; therefore, it is loaded by all the indirect costs. They also reported that it is difficult to differentiate between the indirect costs spent on the main department and those spent on other departments. Moreover, the Libyan Government does not request detailed cost data. This leads to increased product costs in the main department, whereas the products in the sub-departments are priced less than the real cost.

Due to the inappropriate allocation processes in Libyan agricultural firms, the researcher suggests that they should use the ABC framework. Working in a competitive environment encourages firms to implement innovative CASs to reduce the total costs and set competitive prices (Lee & Kao, 2000). Practising ABC in the Libyan agricultural firms will lead to the indirect costs being allocated more appropriately than when using traditional costing, and the overhead costs will be loaded on all the departments, including the sub-departments. However, to use ABC in the Libyan agricultural firms, case studies need to be conducted for every firm separately to determine the cost drivers and cost pools, because every firm produces different types of products and follows different production processes.

Full costing is the CAS that is used in the Libyan agricultural firms, which refers to allocating all costs (fixed and variable) to the product. Lorenz and Brehm (1989) claimed that there are many disadvantages of using full costing, including the managers' lack of ability to control their departments' costs, since the departments will be loaded by common costs. Moreover, the relevant costs needed for planning will not be available when practising full costing, and the cost information for price decisions will be misleading – when the capacity usage is low, the product price will be high and vice versa. This will affect the firms' competitiveness in the market.

As argued in the literature, direct costing is a more appropriate system for managerial decisions (Cooper & Kaplan, 1988); it allocates only variable costs to the products and treats the fixed costs as period costs. Practising direct costing will overcome the shortcomings of full costing, that is, managers can control their departments' costs, because all the variable costs occur within the departments. It easy to determine the minimum prices that will include the direct costs incurred by the product; moreover, practicing direct costing will offer the relevant cost information to managers to enable them to make better decisions (Lorenz & Brehm, 1989). Implementing direct costing instead of full costing might be more appropriate for Libyan agricultural firms; for instance, the managers will be able to control the variable costs that occur in their departments.

Of the six contingent factors, namely the firms' size, level of competition, product diversity, cost structure, importance of cost information, and legal obligations, four of the factors were supported, as there was a positive relationship between them and the use of CASs; these were the size, cost structure, importance of cost information, and legal obligation. These findings are consistent with most of the existing accounting literature, whereas two variables, the level of competition and product diversity, were found not to influence the use of CASs in the Libyan agricultural firms. Although there is a positive relationship between the level of competition and the use of CASs (T = 1.932), the cost structure did not influence the use of CASs in the Libyan agricultural firms, since the value of P (P = 0.061) was higher than the significance level of 0.05 used in this thesis.

Using CASs in the business environment can achieve several objectives, such as determining the product costs, providing cost information for managerial decision making (Hannan, 2008), managing scarce resources to ensure that they are used in an appropriate way to benefit from them as much as possible (Hume-Schwarz, 2007), and providing information for preparing financial reports. Although water and arable land are scarce resources in Libya (Porter & Yergin, 2006), this thesis found that Libyan agricultural firms use cost information mainly for setting the product prices and determining the product costs.

Libyan agricultural firms ought to pay more attention to the use of CASs in an appropriate way and benefit from cost accounting information to make better managerial decisions. It is argued that using CASs in farming will lead to improved farm management, which will increase farm performance; furthermore, farm costing is useful to control the plantation expenditures, which increase as the agricultural processes become modernized (Argilés & Slof, 2001).

7.3 Theoretical Contributions of the Study

This thesis makes several theoretical contributions to the accounting literature related to the use of CASs, particularly in Libyan agricultural firms. The researcher summarizes these contributions below.

This thesis contributes to the accounting literature based on the recommendations of several researchers, including Tahir et al. (2004), Jack and Jones (2007), and Athanasios et al. (2010), who argued that there is a lack of studies related to the use of CASs in agricultural firms. Furthermore, Argilés and Slof (2001) argued that there is a gap between the significance given to accounting and the low level of accounting use in agricultural firms. Athanasios et al. (2010) suggested that accounting researchers should pay more attention to studying the use of CASs in the agricultural sector, especially after the changes that occurred in the agricultural business environment, such as decreased manual labour and increased use of machines to accomplish several processes in the agricultural production, which led to changes in the cost structure (the indirect costs increased and the direct costs decreased). Furthermore, Brierley et al. (2001a) argued that because of the many criticisms directed towards product costing as a result of informal interviews with academics and practitioners or observations of a few companies, accounting researchers ought to increase their efforts to study the use of CASs. In addition, it is argued that there are several accounting issues in Libyan agricultural firms that need to be studied by accounting researchers, as recommended by H. Bawa (personal communication, 1 January 2012). Juchau (1986) also recommended that accounting researchers ought to conduct more research on CASs in the agricultural sector, because the employees in agricultural firms do not understand cost accounting techniques particularly well. Based on the above-mentioned recommendations, this thesis attempts to fill the gap between the theory and the use of CASs in agricultural firms, by adding a new study related to the understanding of the use of CASs in agricultural firms, and to investigate the influence of six contingent factors on the use of CASs in agricultural firms; these factors are the size, level of competition, product diversity, cost structure, importance of cost information, and legal obligation. The size, cost structure, importance of cost information, and legal obligation were found to influence the use of CASs positively, while the competition and product diversity were found not to influence the use of CASs in Libyan agricultural firms.

This thesis is considered to be among the first to attempt to understand how Libyan agricultural firms use CASs and which costing methods they use. From the survey, interviews, and documentation analysis, this thesis tries to understand the way in which Libyan agricultural firms use CASs. However, this thesis revealed that Libyan agricultural firms are still nowhere near using CASs in an appropriate way, as manufacturing firms are, especially concerning the allocation of overhead costs that affect product costing. This thesis's findings support Mostaque et al.'s (1998) study, in which they found that Finnish service firms do not use management accounting systems successfully to provide cost information for decision making, planning, and cost control.

Most of the studies related to the use of CASs have been conducted in developed countries. Although the agricultural sector is more important for the economy of most developing countries, there is a lack of studies related to the use of CASs in agricultural firms. Therefore, this thesis contributes to the cost accounting literature in terms of understanding the use of CASs in agricultural firms in Libya, one of the developing countries. Furthermore, most of the previous researchers studied the use of CASs in manufacturing and service firms. The use of CASs in agricultural firms has been mostly neglected in accounting studies, especially in developing countries. Therefore, this thesis contributes to the accounting knowledge in terms of reducing the gap between the theory and the use by studying the use of CASs in agricultural firms, specifically in Libya, where agriculture has been the most important sector for a very long time and is still considered an important sector to both Libyan citizens and the Libyan Government.

Most of the studies related to the use of CASs in agricultural firms are theoretical studies using descriptive statistics and do not attempt to identify the factors that influence agricultural firms to use CASs. This thesis utilized the descriptive analysis and multivariate statistical techniques, such as factor analysis and multiple regressions, to understand the factors that influence the use of CASs in Libyan agricultural firms. It was found that Libyan agricultural firms' size, cost structure, importance of cost information, and legal obligations positively and significantly influence their use of CASs. These findings are consistent with most of the accounting literature in manufacturing and service firms. On the other hand, the level of competition and product diversity were found not to influence the use of CASs in Libyan agricultural firms, which contradicts most of the accounting literature on manufacturing and service firms.

7.4 Methodological Contributions of the Study

As part of its theoretical contributions, this thesis has significantly contributed to the methodology used, since the majority of the thesis's items were adapted from past studies. The size and cost structure were measured by objective measurements adopted from Al-Omiri and Drury's (2007) study, the level of competition's measurements were adopted from Al-Omiri and Drury's (2007) study, product diversity's measurements were adopted from Baird et al. (2004), the importance of cost information's measurements were adopted from Al-Omiri and Drury (2007), and the use of cost accounting systems' measurements were adopted from Geiger and Ittner's (1996) study. The reliability and the validity of the measures were tested. The Cronbach's alpha value was used to test the reliability; all the Cronbach's alpha values for real data loaded above the recommended value of 0.60. By testing the reliability and validity of the items, it is assumed that this thesis contributes to the body of knowledge on the method specifically in the Libyan context.

In addition, this thesis developed new items to measure legal obligation, and these items were subjected to reliability and validity tests. Both tests proved that these items are reliable and valid for measuring the legal obligation in the Libyan environment. Therefore, this thesis contributes to the method by adding new measurement items. The use of mixed methods is considered another methodological contribution of this thesis, as most of the previous studies used either qualitative or quantitative methods, whereas this thesis used both methods together to overcome the shortcomings of using each method separately.

7.5 Practical Contributions of the Study

Given the dearth of empirical studies on the use of CASs in agricultural firms in Libya, it hoped that the findings of this research will make not only theoretical contributions but also practical contributions in two respects. First, the decision makers in Libyan agricultural firms will benefit from this thesis by identifying the inappropriate uses of CASs, for example, the way in which they allocate overhead costs, since now they allocate all their indirect costs to one department (the plantation department) and trace only the direct costs to the other department (livestock department).

Second, by investigating the factors that influence the use of CASs in Libyan agricultural firms, using a framework of six independent variables, namely the size, cost structure, level of competition, product diversity, importance of cost information, and legal obligation, this thesis can be considered the starting point for further investigations and analysis by adding new factors that the researcher has not included in this thesis, especially for Libyan agricultural firms.

This thesis motivates the Libyan agricultural firms in the government sector to use more appropriate CASs, especially since the business environment in Libya has changed since the cancellation of the economic sanctions in 2003 (IMF, 2006), when many foreign firms began investing in Libya in different sectors, including the agricultural sector. The increase in competition has led to the increased importance of cost information to reduce the product costs (Al-Omiri & Drury, 2007), and producing low-cost products will lead to competitive prices. This thesis explains to decision makers the advantages of using innovative CASs, such as ABC, to determine the product cost appropriately, to assist Libyan agricultural firms to compete with foreign firms and to use scarce resources (water and arable land) in an appropriate way.

This thesis suggests that the suitable CAS to allocate indirect costs is ABC, because Libyan agricultural firms produce several types of products that consume different quantities of resources. For instance, the plantation department produces several products, such as cereals, fruits, and vegetables. Even under cereals, there are many products, such as barley, wheat, and corn. Moreover, in the livestock department, different animals are used to produce various products, such as cows to produce milk and camels and sheep to produce meat. Therefore, resources should be allocated to the main departments first, then to sub-departments. Although the questionnaire's finding indicated that 32.6% of the agricultural firms in Libya implement ABC, the interviewees said that ABC was not used in their firms and that their firms rely on traditional costing. The majority of the Libyan agricultural firms implement traditional costing to allocate indirect costs using the area planted as a measure.

Therefore, the researcher suggests three stages for allocating indirect costs in Libyan agricultural firms, as shown in Figure 6.1 in Chapter Six. The stages start with allocating the firm resources to the main departments (plantation and livestock), then from the departments to the sub-departments, for instance, under the plantation department there are several sub-departments, including vegetables, fruit, and legumes. Every sub-department will be loaded by the department resources according to the amount of resources consumed by the sub-department. Then the sub-department resources will be allocated to the sub-department products, using cost drivers. To identify the cost drivers in Libyan agricultural firms, a case study need to be conducted for every firm separately, because every firm produces different types of products and follows different processes.

Furthermore, understanding the use of CASs in Libyan agricultural firms provides the reasons that made the cost of some products in Libyan agricultural firms, such as barley and wheat, so high; for instance, this thesis found that most of the indirect costs in the Libyan agricultural firms are allocated to the plantation departments, which leads to an increased production cost in the plantation departments. Using the ABC framework suggested by the researcher (see figure 6.1 in Chapter Six) will lead to the allocation of the indirect costs in an appropriate way, which will lead to reduced product costs in the plantation departments.

7.6 Limitations of the Study

Despite the fact that this thesis has achieved its objectives, there are some limitations, as with any study. The first limitation is that the research sample consisted of only the Libyan agricultural firms in the government sector. The research sample was quite small. On the other hand, the findings of this thesis should be interpreted bearing in mind that the survey included the largest Libyan agricultural firms and not the general population of agricultural firms. The results could be different if the research sample consisted of both government and private agricultural firms. Since this research was limited to the Libyan agricultural firms in the government sector, the results cannot be generalized to all Libyan agricultural firms, including the private sector. In addition, combining the two sectors would allow researchers to examine the influence of business ownership on the use of CASs.

The data were collected in January, February, and March 2012 just after the Libyan civil war; therefore, many workers were absent, some documents had been stolen or burned, and in 2011 most of the Libyan agricultural firms did not produce as usual. Therefore, most of the data and documents collected belong to the year 2010 and prior to that.

Moreover, the accounting literature lacks studies related to the use of CASs in agricultural firms; therefore, the researcher relied mostly on the studies on the manufacturing and service sectors, in relation to building the research framework and variables' measurements.

The data were collected at a specific point of time using a cross-sectional survey, which means that the findings might have been different if the data had been collected over a longer period of time. In addition, this thesis did not link the use of CASs in the Libyan agricultural firms and the agricultural firms' performance, which is the final aim of using CASs, since CASs aim to decrease the total cost to improve the performance.

7.7 Recommendations for Future Research

Studying the factors that influence agricultural firms to use CASs opens up new areas for management research to study why accounting researchers have omitted the agricultural sector from their studies. Although this thesis focused on six factors, namely the firm's size, level of competition, cost structure, product diversity, importance of cost information, and legal obligation, the researcher suggests that further research could be conducted on more factors that might influence Libyan agricultural firms to use CASs, for instance the encouragement of top management, firms' strategy, government corruption, the importance of the product, the demand for the product, and government subsidies. The researcher believes that these factors influence the use of CASs in government sector firms.

This research studied the use of CASs in Libyan agricultural firms in the government sector. Therefore, this thesis suggests that future studies might combine agricultural firms in both the government and the private sector in one study, to compare the levels of use of CASs in the two sectors and to examine whether there is a relationship between the use of CASs and business ownership.

This thesis found that most of the Libyan agricultural firms apply traditional costing, while only a few Libyan agricultural firms stated that they are practising ABC. This thesis recommends studying why Libyan agricultural firms still implement traditional costing, although several criticisms have been levelled at traditional costing since the last century. Studies should investigate the benefits of applying traditional costing that cannot be gained from implementing ABC. Furthermore, this thesis examined the relationship between the factors that influence Libyan agricultural firms to use CASs; future studies can be conducted to investigate the relationship between agricultural firms' use of CASs and their performance.

From the field study, the researcher suggests that the best method to study the use of CASs in Libyan agricultural firms is a case study, because every agricultural firm has its own characteristics that differ from those of other firms, such as the strategy and type of products. Scapens (2006) posited that to describe the management accounting systems in use, a case study is the best method. Case studies can answer questions such as how and why. Researchers can rely on this type of methodology to describe the way in which Libyan agricultural firms use CASs. Moreover, case studies provide researchers with deliberate information about targeted firms. The differences in product types among Libyan agricultural firms necessitate the use of a case study; in particular, if a firm wants to use ABC, determining the cost drivers and cost pools requires more detailed information about the firm. Therefore, the researcher suggests that future studies should adopt the case study methodology.

In this thesis, the research sample consisted of Libyan agricultural firms in the government sector, regardless of the type of production that those firms engage in, because some of them produce only cereals, while others produce several products, such as grains and livestock. Therefore, the researcher suggests that future studies should focus only on agricultural firms that produce the same products, which supposes that such firms will have the same organization structure and use almost the same CASs. Furthermore, future studies could link the implementation of CASs in agricultural firms and their performance, which means that they should study whether the use of CASs can influence agricultural firms' performance, for instance whether using the ABC system can lead to scarce resources being used in an appropriate way, as well as discovering non-value-added activities and eradicating them to decrease the costs and increase the profits.

7.8 Conclusion

The use of CASs in business organizations can achieve several objectives, such as providing decision makers with detailed and timely cost information to help make appropriate decisions, which will lead to the production of low-cost products, the setting of competitive prices, and the appropriate use of scarce resources. Changes occurred in the business environment of the agricultural firms in Libya when the United Nations cancelled the economic sanctions in 2003, including several foreign agricultural firms investing in Libya, which made the Libyan agricultural firms work in a competitive environment. However, it is difficult to rely on the simple CASs used in a monopolistic environment to survive in a competitive environment.

This thesis was conducted to achieve one main objective, which was to understand the use of CASs in Libyan agricultural firms. This understanding explains why some agricultural products in Libya cost more than their counterparts in other countries; furthermore, understanding the use of CASs in Libyan agricultural firms provides some solutions to decrease the production costs and suggests some factors that influence Libyan agricultural firms to use cost accounting systems.

This thesis found that most Libyan agricultural firms use traditional CASs; specifically, full absorption costing is widely used by Libyan agricultural firms to calculate the product costs. The quintals of the product are used as the cost unit in plantation departments, whereas the heads of animals are used as the cost unit in livestock departments. The indirect costs are allocated to plantation departments, whereas the cultivated area is used to allocate the indirect costs to the plantation departments. This might be the cause of the increase in the production cost in plantation departments, due to all the indirect costs being allocated to the plantation department. Thus, producing barley and wheat in Libya costs more than producing them in other countries. Therefore, the researcher suggests the ABC framework for use in Libyan agricultural firms; by using the ABC framework, the agricultural firms in Libya will allocate the indirect cost appropriately, which might lead to a decrease in the production cost of barley and wheat.

On the other hand, because all of the Libyan agricultural firms in the government sector are large firms, the size was found to influence their use of CASs significantly. Moreover, the cost structure, importance of cost information, and legal obligations were found to influence the use of CASs in the Libyan agricultural firms statistically and significantly. Surprisingly, this thesis found that the level of competition and product diversity do not significantly influence the use of CASs in Libyan agricultural firms, although most of the accounting literature argued that the level of competition and product diversity are important factors that influence firms to use CASs. This thesis's findings contradict the accounting literature, which might be because most of the previous literature was conducted on manufacturing and service firms.

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