CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In the last few decades, the healthcare sector has grown rapidly. As a result, there has been more attention by citizens and the government focusing on the healthcare services and its providers to achieve higher service quality, lower costs, and better performance. Since, the ability of hospitals to provide higher service quality and lower costs for a large number of patients is necessary for their survival, these hospitals must develop rigorous control over their operations (Ramsey, 1994). In addition, governments are compelled to focus on assessing and improving hospital efficiency due to the increasing trend in health spending (Watcharasriroj & Tang, 2004).

The World Health Organization (WHO) issued a manual for all health care providers involved with the management and funding of hospitals in developing countries. This manual is to assist managers to make the best use of hospital resources, since hospitals consume most of those resources that are available to the health care sector in emerging countries, and understand the cost of various activities to improve the efficiency of hospitals. It enables policy makers in these countries to determine which curative care is best delivered in the hospitals sector (Shepard, Hodgkin, & Anthony, 1998).

Management and cost accounting information plays an important role in hospitals (Pizzini, 2006). In addition, the researchers of management accounting systems (MAS) (e.g., Chenhall & Morris, 1986; Mangaliso, 1995) have argued that the information needs to refer to those qualities of information that are perceived by managers to be useful to facilitate decision-making. These information needs can be considered in terms of general management accounting systems information characteristics that are the user specifications of management accounting systems information characteristics. Managers of organizations who are able to process appropriate information fast can plan for the future and capitalize more effectively and efficiently on emerging problems and opportunities (Chong & Eggleton, 2003; Simons, 2000). Chapman (1998) argued that accounting is the most important and pervasive form of information processing found in firms, because it supplies information to assist managers in decision-making and it assists managers to learn from the past, and determine their current and future direction (Ingram, Albright, Baldwin, & Hill, 2001, p. F4).

Despite the fact that accounting information has an important role to play, it is an imperfect control tool and has to be used in a way that takes account of its limitations, and that is suitable to the circumstances in which it is used (Hammad, Jusoh, & Oon, 2010). Therefore, the responsibility lies with the designers of accounting information systems to develop a full understanding of the information requirements of specific tasks so as to be capable to provide more appropriate information (Clegg, 2000; Otley, 1995; Preston, 1995).

1.2 BACKGROUND ON EGYPT'S HEALTH CARE SYSTEM DILEMMA

Egypt is the largest and most populous country in the Middle East and North Africa. The World Health Organization (WHO, 2009) reported that, "The Egyptian constitution states that health care should be available for every individual. Egypt started building health facilities in urban and rural areas to deliver primary health care (PHC) services in the early 1920s. In urban areas, it took the form of maternal and child health (MCH) centres and in rural areas it took the form of rural health facilities. The programme for rural health services started in 1942 by establishing rural health centres designed to serve about 30,000 inhabitants in one or more villages. Each centre was staffed by a physician and supporting staff. Over the years, Egypt has achieved remarkable progress in providing easily accessible health services, in reducing mortality rates, controlling communicable diseases and reducing population growth. The health sector has many different types of health facilities. primary health care (PHC) facilities provide for: maternal and child health services; communicable diseases control; environmental health services; health education; parasitic and endemic diseases control; school health services; curative and emergency care; family planning; and dental care".

In addition, Hammad et al. (2010, p. 762) reported that, " In the 1970s and 1980s, Egypt enjoyed rapid economic growth, benefiting from the effects of the oil boom in the region generally, and rising revenues from the Suez Canal operations. However, in the late 1980s, resulting economic imbalances and reduced growth in neighbouring oil economics led to a substantial deterioration in economic performance. Since the early 1990s, Egypt started a

gradual program of economic adjustment and privatization (HassabElnaby, Epps, & Said, 2003; Rannan-Eliya, Nada, Kamal, & Ali, 1997). In 1994, the Egyptian government passed Decree 304 initiating its health care reform".

Furthermore, Hammad et al. (2010, p. 764) reported that, "In Egypt, the major health care providers in the government sector are the Ministry of Health and Population (MOHP), which runs a nationwide system of health services, ranging from outpatient clinics to large urban-based hospitals, and providing a mix of inpatient and outpatient care. These services are administered on a decentralized basis, with most service facilities run by Egypt's governorates, which are the major sub-national governmental authorities in Egypt (Rannan-Eliya, Blanco-Vidal, & Nandakumar, 2000). There are other health facilities and hospitals that are affiliated to other different ministries such as Defense, Transport, Aviation, Electricity and Interior, and university medical teaching hospitals where two systems prevail, free curative services or fixed fee services for those who can afford. Government-owned hospitals are the only choice available to low-income groups who constitute the majority of Egypt's population. These hospitals are however, hampered by the huge demand and the government's failure to keep up with escalating costs, financial constraint, inefficient use of available resources and ineffective management (Rannan-Eliya et al., 2000; WHO, 2009).

In addition, the Health Insurance Organization (HIO) is the major government financier and provider of care. This is a compulsory social insurance agency, levying mandatory payroll contributions on all formal sector workers, their employers, and public pensioners. The health insurance system covers about 50% of the population (34.8 million) including

governmental workers, retired workers, students and pre-school children. The Health Insurance Organization (HIO) spent about 1.65 billion Egyptian pounds in 2003 to provide its services to the population covered. The main problems facing the Health Insurance Organization (HIO) in Egypt are the large number of regulations and the unrealistic rates of premium that have been fixed and unchanged since 1964 (WHO, 2009).

The private sector, where in Egypt it plays an important role in delivering health care, consists of both non-profit non-governmental organization (NGO) providers, as well as for-profit providers, such as private medical clinics, private hospitals and pharmacies. Competition within the private sector has induced the provision of optimum care and therefore the private sector became highly rated in the region over the years (Rannan-Eliya et al., 1997; WHO, 2009). In summary, Egypt has a highly pluralistic health care system, as shown in Table 1.1, with various government, private and semi-government (the Government of Egypt own these hospitals, but financially independent from it, that comprises government-owned and commercial companies) providers and financing agents (Rannan-Eliya et al., 1997). The health care system in Egypt is quite complex, coupled with inept governance".

In addition, the World Health Organization (WHO, 2009) reported that, "Health policies and strategies are not supported by evidence and regulatory mechanisms are not well developed. The health system remains highly centralized while efforts are being made to decentralize it to district level. Coordination within the Ministry of Health and Population (MOHP) and with other related agencies and ministries remains weak".

Table 1.1: Health Care Statistics in Egypt (2006-2008)

	Governmental			Private			Semi-governmental			Total		
	2006	***2007***	***2008***	***2006***	***2007***	***2008***	***2006***	***2007***	***2008***	***2006***	***2007***	***2008***
Hospitals	1187	1179	1146	664	679	686	21	20	17	1872	1878	1849
Beds	116033	114645	108966	17871	18264	19802	1006	1021	977	134910	133930	129745
Physicians	46664	46653	51111	9251	11007	12561	548	480	430	56463	58140	64102
Nurses	94346	96031	101145	9629	10486	11778	733	723	733	104708	107240	113656
Clinics Without inpatient	3623	3672	4182	170	174	178	30	28	26	3823	3874	4386
Physicians	19273	18586	21805	1704	1501	1603	313	232	283	21290	20319	23691
Nurses	41661	51016	58804	656	593	513	321	281	223	42638	51890	59540

"Source: Arab Republic of Egypt: Central Agency for public Mobilization and Statistics (CAPMAS) www.capmas.gov.eg"

Furthermore, as referred to in Hammad et al., (2010), "In spite of the growth of governmental, semi-governmental and private hospitals in Egypt since 1974, the quality of services provided to patients remains weak, mainly due to lack of professional training and usage of modern technology (Mostafa, 2005). Although Egypt did achieve substantial reductions in child mortality, its overall health care performance remains poor in comparison with other countries at its income level[1]. In fact, the health care system in Egypt facing considerable challenges. These challenges are compounded by:

1. Complexity of the system itself especially the existence of a multitude of health care providers and financing mechanisms,

[1]"Approximately 6.3% of Egyptian GDP was spent on healthcare in 2006. Per capita spending was US$78. This level of spending is lower in comparison to most developing countries, despite Egypt's higher income level (WHO, 2008, 2009). WHO country page http://www.who.int/countries/egy/en/"

2. Underfunding,
3. The separation of responsibility for training of physicians from that for delivery of health care, pressure from donors,
4. Over employment in the public sector with low remuneration and low motivation,
5. Inefficient and highly centralized system of administration using outdated management techniques, and
6. Ill equipped and under resourced (human and financial) public health facilities which prompt the public to turn to the poorly regulated private sector.

The management skills and practices employed throughout the health sector are not conducive to promoting effectiveness and efficiency in the system. Also, there are poor managerial skills and inadequate health information system for non-communicable disease surveillance, stewardship and decision-making (Rannan-Eliya et al., 1997; WHO, 2009; Zineldin, 2006).”

1.3 PROBLEM STATEMENT

The programme of health care sector reform in Egypt started in 1997 and it will continue until 2018. This reform has five guiding principles; the only principle that is related to the scope of this study is health care efficiency, which means:

> *“Allocating and mobilizing human and infrastructure resources for health care based on population needs and cost-effectiveness. The government and citizens will obtain the best health value for money (WHO, 2009)”.*

In addition, Egyptian healthcare reform requires changing the manner in which hospitals work in Egypt by enforcing and encouraging hospital staff to accept private sector traditions. It seeks to change the image of public hospitals from being only health care institutions to multi-products firms. Despite the Egyptian health care reform, the citizens and government recognize that the performance of the health sector is still unsatisfactory (Hassan, 2005; Mostafa, 2005; Zineldin, 2006).

In addition, private hospitals face pressure from citizens, insurance companies and firms to become more cost efficient (Hammad et al., 2010). Rannan-Eliya (1995) found that 56% of total health care spending in Egypt was consumed by the private health care sector. Furthermore, the World Health Organization (WHO) reported in 2005 that private expenditure on health represents 62% of total health care expenditure. In addition, the private hospital sector in Egypt struggles to remain profitable at 60% to 70% occupancy rates (Gericke, 2004). Therefore, improving health care quality is crucial to survive in this changing environment (Zineldin, 2006). Furthermore, the reform of the healthcare sector in Egypt has resulted in increased competition in the Egyptian health care market. Therefore, the effective implementation of information systems should improve the performance of organizations, as better usage of information is expected to lead to an enhanced decision making process (Seliem, Ashour, Khalil, & Millar, 2003). Consequently, to survive in this competitive environment, hospitals must avoid persistent financial losses and they must use their resources efficiently. In addition, to optimize hospital performance and lead other personnel effectively, physicians, as key personnel in the service process of hospitals, are required to assume management responsibility and possess management skills (Comerford & Abernethy, 1999; Vera & Hucke, 2009).

Management and cost accounting information is not restricted to manufacturing organizations, as it also plays an important role in the context of hospitals. Kettelhut (1992) argued that there are three essential requirements for the accounting systems of hospitals:

1. They must continue to support traditional tasks like tracking patients, billing, payroll, and other accounting functions.
2. They must be used to increase hospital marketing effectiveness.
3. They must be used to measure and improve hospital efficiency.

Furthermore, Ramsey (1994) suggested that accounting systems should serve three purposes. First, they should promote cost efficiency within the hospital without sacrificing the institution's service quality. Second, they should allow the hospital to maximize its resources through service line management. Finally, they should highlight opportunities for continuous improvement of the hospital's operations.

Due to the essential role of management and cost accounting information, Triest and Elshahat (2007), in Egypt, investigated the use of managerial and costing information. The results of their study indicated that the use and sophistication of managerial and costing information is limited. Also, they found no application for advanced accounting techniques and the concepts of activity-based costing are largely unknown. In addition, managerial and costing information is employed for pricing decisions rather than performance measurement, process improvement and cost reductions. Simon (2007) concluded that superior performance is a product of an appropriate fit between the identified contextual

variables and the management accounting systems. Therefore, this study aims to determine the contingent variables that influence the extent of use of management accounting systems information and investigate how the appropriate fit between these contextual variables and the management accounting systems information, which serves as the mediator, would enhance the managerial performance of Egyptian managers in health care. Finally, it aims to examine the effect of hospital size on the relationships between the contextual variables, management accounting systems information, and managerial performance

1.4 RESEARCH QUESTIONS

This study, according to the problem statement described in the previous section, attempts to determine the contingent variables that influence the extent of use of management accounting systems information. In addition, it investigates how the appropriate fit between these contextual variables and management accounting systems information characteristics, which serve as the mediator, would enhance the managerial performance of Egyptian managers in health care. Finally, it investigates the effect of hospital size on the relationships between the contextual variables, management accounting systems information, and managerial performance. Consequently, the following research questions were developed:

1. How do these contextual factors (technology, organizational structure, and perceived environmental uncertainty) influence the extent of use of management accounting systems information in Egyptian hospitals?

2. Which dimensions of management accounting systems information enhance managerial performance in Egyptian hospitals?
3. Does management accounting systems information mediate the relationship between contextual factors (technology, organizational structure, and perceived environmental uncertainty) and managerial performance?
4. Does hospital size affect the relationship between contextual factors (technology, organizational structure, and perceived environmental uncertainty), management accounting systems information, and managerial performance?

1.5 RESEARCH OBJECTIVES

1.5.1 General Research Objectives

Providing empirical evidence concerning the relationship between contextual variables (technology, organizational structure, perceived environmental uncertainty, and hospital size) and management accounting systems information and their impact on managerial performance in the hospital industry within the Egyptian context is the main objective of the current study.

1.5.2 Specific Research Objectives

In harmony with the main research objectives, the detailed research objectives are stated as follows:

1. To determine the influence of contextual factors (technology, organizational structure, and perceived environmental uncertainty) on the extent of use of management accounting systems information in Egyptian hospitals.
2. To determine the prominent dimensions of management accounting systems information that enhances managerial performance in Egyptian hospitals.
3. To examine whether management accounting systems information mediate the relationship between the contextual factors (technology, organizational structure, and perceived environmental uncertainty) and managerial performance.
4. To examine whether hospital size affect the relationship between the contextual factors (technology, organizational structure, and perceived environmental uncertainty), management accounting systems information, and managerial performance.

1.6 SIGNIFICANCE OF THE STUDY

The current research seeks to make a contribution to the literature of management accounting systems design through filling the empirical gap that exists within developing countries, especially in the Egyptian context (see, Triest & Elshahat, 2007). In addition, in Africa, this study is one of the few studies of management accounting systems (e.g., Soobaroyen & Poorundersing, 2008), and, to the best of one's knowledge, other than Hassan's (2005) case study, there is no empirical research on the use of management accounting systems information in Egyptian hospitals. In the hospital industry, to date, despite the relationships between contextual variables and cost/management accounting systems and their impact on organizational or managers' performance have been partially examined through only few studies done in Western context (e.g., Abernethy & Brownell,

1999; Abernethy & Lillis, 2001; Cardinaels, Roodhooft, & Herck, 2004; Counte & Glandon, 1988; Devaraj & Kohli, 2000; Hill, 2000; Hill & Johns, 1994; K. K. Kim, 1988; C. M. Lawrence, 1990; Pizzini, 2006) as shown in Table 1.2. Triest and Elshahat (2007) indicated that the use and sophistication of managerial and costing information is limited in the Egyptian manufacturing sectors. The service sectors, especially the hospital sector, are also behind in applying sophisticated managerial and costing systems. In addition, "In the pre-reform era, there was a lack of concern about the need for accurate and reliable performance information in Egyptian hospitals" (Hassan, 2005, p. 131). As a result, there are no financial and non-financial indicators available to evaluate the performance of Egyptian hospitals similar to hospitals in the developing countries.

Despite many of the MAS contingency-based studies conducted in other industries, such as the manufacturing sector (e.g., Chia, 1995; Chong & Chong, 1997; Gerdin, 2005a; Mia, 1993; Mia & Clarke, 1999; Soobaroyen & Poorundersing, 2008), the majority of these studies examined the contextual variables in isolation. Since Fisher (1998) argued that the relationships and causality among the contingent variables are difficult to uncover by examining the contextual variables in isolation. This study addresses the point made by Fisher (1998), by examining many contextual variables in one model using management accounting systems information as an intervening variable, contributes to the development of management accounting systems in hospitals.

Table 1.2: Western Studies in Hospitals sector

Author(s)	Country	Objective(s) of the study
Abernethy and Brownell, (1999)	Australia	"Examine the relationship between strategic change, style of budget use (as a moderator) and hospital performance".
Abernethy and Lillis, (2001)	Australia	"Examine the effect of the relationships between service innovation and both structural autonomy and performance measurement system (clinical management performance and resource management performance) as a mediator, on organizational outcomes (efficiency, effectiveness)".
Cardinaels, Roodhooft, Herck, (2004)	Belgium	"Examine the relationships between drivers of cost system development in hospitals (e.g., cost variability, cost importance, quality link, etc) and the stage of cost system development".
Counte and Glandon, (1988)	USA	"Examine the extent to which hospitals in a major market are actually beginning to use standard cost-accounting systems and identify factors that either aid or hinder the diffusion of these methods".
Devaraj and Kohli, (2000)	USA	"Examine the relationship between investment in information technology (IT) and hospital performance, also, examine the combined effect of technology and business process reengineering (BPR) on hospital performance".
Hill, (2000)	USA	"Investigate the impact of governmental cost controls through changes in the Medicare reimbursement system and increased competition on the adoption of hospital costing systems over the period 1980-1990 in hospitals".
Hill and Johns, (1994)	USA	"Examine the use of costing information in hospitals".
K. K. Kim, (1988)	USA	"Examine the interaction effects of organizational context and hospital accounting information systems (HAIS) design variables on hospital performance".
Lawrence, (1990)	USA	"Examine the effect of ownership structure and accounting system type on hospital costs".
Pizzini, (2006)	USA	"Examine the association between cost-system functionality, managers' evaluations of the relevance and usefulness of cost data, and actual financial performance using a sample from hospitals".

In addition, this study provides a better understanding of the relationships between contextual variables, management accounting systems information use and the managerial performance for designers of management accounting systems, particularly for enhancing managerial performance in hospitals, and for the policy makers responsible for the reform of the healthcare system. For example, management accounting systems supply information to assist managers in decision making and it assists them to learn from their past, and determine their current and future direction. The current study offers managers some useful aspects related to the function of management accounting systems information that can be used to enhance their managerial performance, as the provision of better information facilitates more effective managerial decisions, which, in turn, enhances organizational performance (Cadez & Guilding, 2008). In addition, the current study may provide the Egyptian policy makers who are responsible for the reform of the healthcare system some direction to re-organize the Egyptian hospitals and help them to close the gap between private and governmental hospitals' practices.

This study provides rational justifications for using the contextual variables (technology, organizational structure, perceived environmental uncertainty, and organizational size), management accounting systems information, and managerial performance in research framework for Egyptian hospitals context, as following:

i. The rational of inclusion and using technology as a contextual variable in this study is what Mostafa (2005, p. 516) argued that "Despite the growth of both public and private hospitals in Egypt, the quality of services provided to patients is increasingly brought into question mainly due to a lack of professional training and use of modern technology, There is in fact a dire need to invest in hospitals and

clinics in order to provide quality care to patients". In addition, Hassan (2005, p. 125) showed, in contrast to the technical role of accounting, "How management accounting is acted upon to disrupt the hospital's micro institutions and routines, challenge physicians' professional and bureaucratic power and therefore engendering the public hospital to change".

ii. The rational of inclusion and using organizational structure as a contextual variable in this study is what previous studies and WHO reported that, the health system remains highly centralized while efforts are being made to decentralize it to district level, in addition, there are inefficient and highly centralized system of administration using outdated management techniques in the Egyptian health care system (Rannan-Eliya et al., 1997; WHO, 2009; Zineldin, 2006).

iii. The rational of inclusion and using perceived environmental uncertainty as a contextual variable in this study is what Hassan (2005, p. 136) referred to the important of studying the hospitals' environment when he stated, "Although the paper has aimed at investigating the role of management accounting within the changing hospital, this role was not independent from the broader environment outside the hospital. Consequently, the analysis has looked beyond the boundaries of the reformed hospital and considered more general interests, which are grounded in the institutional context of the transitional Egyptian health sector". In addition, Egyptian hospitals face pressure from citizens, insurance companies, firms, and donors to become more cost efficient (Rannan-Eliya et al., 1997; WHO, 2009; Zineldin, 2006), furthermore, the reform of the healthcare sector in Egypt has

resulted in increased competition in the Egyptian health care market (Seliem et al., 2003). Also, in Egyptian context, Hassab Elnaby et al. (2003) studied the effect of environmental factors on accounting development. They found that the relationship between accounting development (the development of the accounting profession and the system of accounting education) and two of the environmental factors (economic and political) is positively strong and varies with time.

iv. The rational of inclusion and using organizational size as a contextual variable in this study is the complexity of the Egyptian health care system itself especially the existence of a multitude of health care providers and financing mechanisms (Rannan-Eliya et al., 1997; WHO, 2009; Zineldin, 2006).

v. The rational of inclusion and using management accounting systems information as an intervening variable in this study is due to inadequate health information systems in Egypt for non-communicable disease surveillance, stewardship and decision-making (Rannan-Eliya et al., 1997; WHO, 2009; Zineldin, 2006). In addition, in Egyptian hospitals context, Hassan (2005, p. 125) showed that management accounting is acted upon to disrupt the hospitals' micro institutions and routines, challenge physicians' professional and bureaucratic power and therefore engendering the hospitals to change.

vi. The rational of inclusion and using managerial performance as a dependent variable in this study is that the overall health care performance in Egypt remains poor in comparison with other countries at its income level. In addition, there are over

employment in the governmental sector with low remuneration and low motivation. Also, the management skills and practices employed throughout the health sector are not conducive to promoting effectiveness and efficiency in the system (Rannan-Eliya et al., 1997; WHO, 2009; Zineldin, 2006)."

1.7 SCOPE OF THE STUDY

In recent years, the importance of service and not-for-profit organizations within most economies has increased. As a result, Chenhall (2003) suggested that there is a need for more contingency-based research into these entities. In addition, due to recent environmental changes and increased competitive pressure, healthcare organizations face pressure to achieve higher service quality, increase patient's satisfaction and reduce their costs (Alexander, Weiner, & Griffith, 2006). For example, a steady increase in the cost of providing healthcare services results from changing disease patterns, which lead to advances in medical knowledge and technology (Kumar & Ozdamar, 2005). In addition, the increasing public demand for advanced medical care results from the ageing population and a greater awareness of new medical possibilities (Myllykangas et al., 2003). Therefore, in healthcare operational settings, monitoring, tracking and improving service quality, availability and efficiency are becoming more critical (Gomes, Yasin, & Yasin, 2010).

In the healthcare sector, Ramani (2004) argued that a comprehensive hospital management information system is necessary to help managers in the efficient and effective planning and monitoring of hospital services. To coordinate the activities of various units, such as clinical wards, operating theatres, investigation departments and hospital stores, planning

decisions require a clear understanding of the hospital logistics to support the delivery of hospital services. In addition, a comprehensive hospital management information system helps managers monitor and control decisions such as patient flow management, inventory management, and billing systems. In response to the above arguments, it is necessary and timely that this study focuses on the Egyptian hospital sector, since the Egyptian services sector is growing rapidly and has become the largest sector in terms of share in GDP, and plays a major role in the economy of Egypt (Agriculture 14%, industry 36% and services 50% of GDP).[1]

1.8 DEFINITION OF RESEARCH VARIABLES

There are six main variables in the research framework, namely, management accounting systems (MAS) information, technology, organizational structure, perceived environmental uncertainty (PEU), hospital size, and managerial performance, which are briefly defined as follows:

1.8.1 MAS Information Characteristics

Chenhall (2003) defined management accounting system (MAS) as, "A formal system designed for providing managers with the requisite information to facilitate decision making and evaluation of managerial activity". Hence management accounting systems serve two functions: the first function is to facilitate managerial decision-making and the second one is to control the behaviour of managers of subunits by superiors (Abernethy &

[1] World bank 2008 (www.worldbank.org)

Bouwens, 2005). Since the current study concentrates on the facilitating role of management accounting systems to support managers' decisions and assesses management accounting systems within the hospital industry, it conceptualizes management accounting systems according to the four information characteristics of Chenhall and Morris (1986) (scope, timeliness, aggregation, integration). Designing this study to differentiate between the four information characteristics allows the researcher to examine the importance of each dimension under several contextual variables. "Scope" comprises three sub-dimensions – focus, quantification, and time horizon. Accordingly, narrow scope information concerns events internal to the organization, and provides financial and historic information. In contrast, broad scope information includes external, non-financial, and future-oriented information. In addition, timeliness means the ability of management accounting systems to supply information concerning the demand from systematically collected information. Moreover, summarized information that covers periods of time or various management areas of interest, such as responsibility centres or functional areas, is provided by the aggregation of information. Finally, integration of information refers to the process of putting together data that crosses functional boundaries (Chenhall & Morris, 1986).

1.8.2 Technology

In organizational behaviour, "technology" has many meanings. Although technology generally refers to how the process of organization's operate, which includes people, knowledge, software, hardware and materials, the definition of technology by Perrow (1967) is based on the number of exceptions in the product or service generation process and the nature of the search process when exceptions are encountered. From the

organizational literature, three basic types of technology are identified that are important to management accounting systems: task uncertainty, interdependence and complexity (Chenhall, 2003; Otley, 1995). Galbraith (1977) defined task uncertainty as, "The difference between the amount of information required to perform the task and the amount of information already possessed" (Chong, 1996, p. 416). According to Perrow, task uncertainty has two basic dimensions; the first dimension is task variability, which refers to the number of exceptions or problems in the task, while the second one is task analysability, which refers to the difficulty of searching solutions to problems. However, Chenhall and Morris (1986, p. 18) stated that, "Organizational interdependence refers to the exchange of output that takes place between segments within a sub-unit". In addition, Thompson (1967) argued that the interdependence among the organization's subunits is one of the key components of organization technology (pooled, sequential and reciprocal interdependencies). Therefore, in this study, the researcher used task uncertainty and departmental interdependence as the main dimensions of technology.

1.8.3 Organizational Structure

"Decentralization" refers to the level of autonomy delegated to managers. In decentralized organizations the managers have greater responsibility over planning, control activities, and greater access to information not available to the corporate body (Bruns & Waterhouse, 1975; Waterhouse & Tiessen, 1978). In addition, these organizations are designed so that managers have wide spans of attention. Thus, when business strategy demands quick and agile responsiveness to customers and markets, decentralized organizations become essential and the business units in these organizations are market-based, with employees of the unit interacting directly with customer and markets (Simons,

2000). In the current study, the degree to which decision autonomy is delegated to managers is used to refer to decentralization.

1.8.4 Perceived Environmental Uncertainty (PEU)

The environment was defined by Duncan (1972, p. 314) as, "The totality of physical and social factors that are taken directly into consideration in the decision-making behaviour of individuals in the organization". Also, on page 318, Duncan defined environmental uncertainty as:

> *"The lack of information regarding the environmental factors associated with a given decision-making situation, not knowing the outcome of a specific decision in terms of how much the organization would lose if the decision were incorrect, and inability to assign probabilities with any degree of confidence with regard to how environmental factors are going to affect the success or failure of the decision unit in performing its function". (Duncan, 1972, p.318)*

Trying to measure uncertainty, empirical research (e.g., Chenhall & Morris, 1986; Gordon & Narayanan, 1984) has used perceived environmental uncertainty rather than objectively (C. Fisher, 1996). In addition, after a broad review of management accounting systems studies that examined the environmental uncertainty role, Tymond, Stout, and Shaw (1998) recommended that the perceptions of high level managers of the external environment should be involved in the measures.

1.8.5 Hospital Size

Size has been defined and measured in the majority of contingency-based management accounting systems (MAS) studies as the number of employees (Abernethy & Bouwens, 2005; Choe, 1996; Davila, 2005; Dossi & Patelli, 2008; Gerdin, 2005b; Govindarajan, 1988; Libby & Waterhouse, 1996; Merchant, 1981; Raymond, 1990). However, Chenhall (2003) argued that, "It is possible that the precise measure of size could be important depending on the element of context and dimensions of management accounting systems being studied". For example, many studies in the hospital context (e.g., Abernethy & Brownell, 1999; Cardinaels et al., 2004; Carter, Lonial, & Raju, 2010; K. K. Kim, 1988; Pizzini, 2006) used the number of beds as a measure of hospital size. Following these studies, the current study assessed hospital size using the number of beds.

1.8.6 Managerial Performance

Due to the various interpretations of its meaning "Performance" is a difficult word to define. In the management context, the term "Performance" can be used at different levels (i.e., individual, team, and organisational performance) to describe overall achievement or to reflect a benchmark against peers (Brudan, 2010). Due to the limited value of objective performance indicators in the current study, a subjective approach was taken to measure the performance of managers of departments. Through self-evaluation questions, managerial performance was measured using the instrument that was developed by Mahoney, Jerdee and Carrol (1963, 1965). Based on eight sub-dimensions (planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing) managers were asked to rate their own perceived performance.

1.9 ORGANIZATION OF THE THESIS

This study consists of six chapters. The overall view of the whole research is provided in chapter one. In this chapter, the introduction, problem statement, questions, objectives, significance, scope of the study and definition of research variables are highlighted. The literature in the areas of management accounting systems (scope, timeliness, aggregation and integration information), contingency factors (technology, organizational structure, perceived environmental uncertainty, and hospital size), and finally theory of work performance and managerial performance are covered in chapter two. Chapter two also includes some background concerning the Egyptian health care industry. The discussion of the literature is rooted in the contingency theory.

The theoretical framework and research hypotheses of the current study were developed in chapter three, from a comprehensive review of the previous literature regarding the relationship among the contingency factors (technology, organizational structure, perceived environmental uncertainty, and hospital size), management accounting systems information, and managerial performance. The research methodology is covered in chapter four to explain the research design, research site, sampling and data collection procedures, and questionnaire design in order to obtain the data used to test the research hypotheses. In addition, this chapter explains the measurement of the research variables and the statistical techniques used in data analysis.

Chapter five reports the results obtained from the data analysis techniques used in this study, and, finally, in chapter six the findings and results of the current research, which

provides additional insights concerning the findings of previous studies, the theoretical and practical implications, the limitations of this study and suggestions for future research, as well as conclusions, are fully discussed in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Fitzgerald, Johnston, Brignall, Silvestro, and Voss (1991) identified five characteristics that distinguish service organizations from other types of organization (Brignall, 1997, p. 327):

1. Service managers face threats and have opportunities in service organizations due to the presence of consumers during the process of service delivery.
2. There is difficult to know what the customer values because many aspects of services are intangible.
3. There are two ways of making services heterogeneous: the variation of service standards as a result of the frequently high labour content and the variation of customer expectations.
4. Due to the simultaneous production and consumption of most services, services cannot be counted or tested prior to delivery.
5. As services are perishable it means that most services cannot be stored.

These characteristics make service organizations just-in-time organizations, and create difficulties in the operational control, performance measurement as well as tracing, measuring, and controlling the cost and quality of the service product (Anthony & Govindarajan, 2007; Brignall, 1997; Horngren, Sundem, Stratton, Burgstahler, &

Schatzber, 2008). Hospitals, as important service organizations have some unique features that are typically not observed in other industries (Eldenburg, 1994; Hariharan, Dey, Moseley, Kumar, & Gora, 2004; Kohli & Kettinger, 2004). Therefore, Cavana, Delahaye, and Sekeran (2001, p. 215) stated that "scales used in manufacturing industries might have to be modified slightly to suit health care organizations and it would be advisable to test the validity and reliability again". In addition, physicians and other medical parties are apparently powerful coalitions when it comes to designing accounting systems (Abernethy & Vagnoni, 2004; Cardinaels et al., 2004; Kohli & Kettinger, 2004).

Furthermore, when outside institutional forces create pressure on hospital managers to reduce hospital costs in the absence of strong direct control over the physicians, who are responsible for the usage of hospital resources and quality of patient outcomes (Chilingerian & Sherman, 1990; Gupta, 1991; Kohli & Kettinger, 2004), it represents a major problem for those managers (Abernethy & Chua, 1996; JÃrvinen, 2006). Hence, agency theorists (e.g., Eisenhardt, 1985, 1989; Ouchi, 1979, 1980) proposed two approaches to help principals (hospital managers) to improve the efficiency of contract compliance between them and the agents (physicians):

1. Monitor agent behaviour through designing information systems; or,
2. By tracking their actual performance

Accordingly, instead of an explicit contract, accounting data is likely to be used to control the behaviour of physicians (Covaleski, Dirsmith, & Michelman, 1993; Pizzini, 2006). Some researchers (e.g., Eldenburg, 1994; Evans, Hwang, & Nagarajan, 1995) found that when presenting physicians with data on their own costs along with comparative cost and

operational information, they have some incentive to adjust their behaviour. Therefore, to diminish physician-hospital agency problems, hospitals must have an accounting system that provides appropriate data (Lapsley, 2001; Pizzini, 2006). Also, to monitor managerial performance, board members increasingly use cost, profit, and operational data to assist with the increased pressure on the healthcare sector to reduce its cost (Aird, 1996; Brickley & Horn, 2002; Doolin, 2004; Molinari, Hendryx, & Goodstein, 1997). In addition, the high functionality of accounting systems through better association of costs with a manager's actions and decisions can provide measures that contain more information about a manager's effort (Naranjo-Gil & Hartmann, 2006; Pizzini, 2006).

The rest of this chapter, first, deals with the concept of management accounting systems and their information characteristics, as identified by Chenhall and Morris (1986), are discussed. This is followed by a discussion on the contingency theory, which underlines the research framework of this study. Inside the contingency framework, the discussion covers the contextual variables that form the theoretical model, namely, technology, organizational structure, perceived environmental uncertainty and organizational size. Finally, the work performance theory and managerial performance are discussed.

2.2 MANAGEMENT ACCOUNTING SYSTEMS (MAS)

Accounting was defined by the Financial Accounting Standards Board (FASB), in its statement of financial accounting concepts no. 2, "As being an information system" and providing information useful to decision makers is the primary objective of accounting (Romney & Steinbart, 2003). Furthermore, accounting was defined by Drury (2000, p. 4)

as, “A language that communicates financial and non-financial information to people who have an interest in an organization; managers, shareholders and potential investors, employees, creditors and the government”. Ultimately, all accounting information is accumulated to assist someone in decision-making (Horngren & Sunden, 1993, pp. 2-3). Consequently, accounting information is essential to all well-managed businesses and non-profit organizations. In addition, a good barometer of organizational health is the amount and quality of information available to managers of any organization. Therefore, Managers of organizations that are able to process appropriate information fast can plan for the future and capitalize more effectively and efficiently on emerging problems and opportunities (Chong & Eggleton, 2003; Simons, 2000). Chapman (1998) argued that accounting is the most important and pervasive form of information processing found in firms, because it supplies information to assist managers in decision-making and it assists them to learn from the past, and determine their current and future direction (Ingram et al., 2001).

Despite the fact that accounting information has an important role to play, it is an imperfect control tool and has to be used in a way that takes account of its limitations, and which is suitable to the circumstances in which it is used (Hammad et al., 2010). Therefore, the responsibility lies with the designers of accounting information systems to develop a full understanding of the information requirements of specific tasks so as to be capable of providing more appropriate information (Clegg, 2000; Otley, 1995; Preston, 1995). In the developing countries context, many studies (e.g., Braa, Hanseth, Heywood, Mohammed, & Shaw, 2007; Diamond & Khemani, 2006; Kimaro & Nhampossa, 2005) found that the limited success of management information systems in healthcare is caused by many issues, such as failure to meet manager’s needs or functional requirements, overestimating

the information to be included in the system and underestimating the required management input.

Management accounting information can assist managers to identify the main issues, solve problems, and evaluate performance. In addition, this information is used in all kind of organizations (e.g., manufacturing, merchandising and service). Also, this information is essential both in for-profit and not-for-profit organizations. As a result, Mowen and Hansen (2006, p. 5) argued that, "Regardless of the organizational form, managers must be able to use accounting information". In addition, some researchers (e.g., Chenhall, 2003; Widener, 2004) stated that managers can make progress towards organizational goals and achieve desired outcomes by using control systems that are designed to help them to achieve these objectives. Since, higher quality decisions are a natural outcome of using higher quality relevant information and decision making practices (Brooks, Oliver, Vesty, Eldenburg, & Wolcott, 2005, p. 2). management accounting information helps managers to develop organizational strategies, create operating plans, and monitor and motivate organizational performance (Anthony, 1989; Drury, 2000; Hussain & Gunasekaran, 2001).

Furthermore, for many years the use of management accounting systems received more attention in hospitals (Nyland, Pettersen, & Ostergren, 2009). For example, the costing of clinical activities and the use of budgets in hospitals were the most common issues discussed in previous studies (e.g., Coombs, 1987; Jacobs, 1998; Lapsley, 1994; Nyland & Pettersen, 2004). Furthermore, Ramani (2004) argued that a comprehensive hospital management information system is necessary to help managers to plan and monitor

hospital services efficiently and effectively. To coordinate the activities of various units, such as clinical wards, operating theatres, investigation departments and hospital stores, planning decisions require a clear understanding of the hospital logistics to support the delivery of hospital services. In addition, a comprehensive hospital management information system helps managers to monitor and control decisions, such as patient flow management, inventory management and billing system.

Furthermore, Chenhall (2003, p. 129) stated that, "Management Accounting (MA) refers to a collection of practices such as budgeting or product costing, while Management Accounting System (MAS) refers to the systematic use of MA to achieve some goal". As the main study objectives using management accounting information to enhance the managerial performance of Egyptian managers within the hospital sector, the current study uses the term of management accounting systems (MAS). Hence, management accounting systems serve two functions: the first function is to facilitate managerial decision-making and the second one is to control the behaviour of managers of subunits by superiors (Abernethy & Bouwens, 2005). The current research concentrates on the facilitating role of management accounting systems to support managers' decisions within the hospital industry. Therefore, management accounting systems are conceptualized according to the MAS information characteristics (scope, timeliness, aggregation, integration) of Chenhall and Morris (1986), because designing this study to study to differentiate between the four information characteristics allows the researcher to examine the importance of each dimension under several contextual variables.

The characteristics of management accounting systems that contingency theory research has focused on consist of: budgeting dimensions (e.g., importance of meeting budgets, and participation), reliance on accounting information for performance evaluation and dimensions of information (e.g., timeliness and level of aggregation) (Drury, 2004, p. 696). Many previous studies employed the management accounting systems information characteristics concepts and measures that were developed by Chenhall and Morris (1986) (e.g., Abernethy & Guthrie, 1994; Boulianne, 2007; Bouwens & Abernethy, 2000; Chang, Chang, & Paper, 2003; Chia, 1995; Chong, 1996, 1998, 2004; Chong & Chong, 1997; Chong & Eggleton, 2003; C. Fisher, 1996; Gerdin, 2005b; Gul, 1991; Gul & Chia, 1994; Lal & Hassel, 1998; Mia & Chenhall, 1994; Moores & Yuen, 2001; Sharma, Jones, & Ratnatunga, 2006; Soobaroyen & Poorundersing, 2008; Tsui, 2001). The details of the four information characteristics (scope, timeliness, aggregation and integration) that were identified by Chenhall and Morris (1986) are discussed in the next section.

2.2.1 Scope

"Scope" comprises three sub-dimensions: focus, quantification, and time horizon. Accordingly, narrow scope information concerns events that are internal to the organization, and provide financial and historic information, whereas broad scope information includes external, non-financial, and future-oriented information (Chenhall & Morris, 1986). For example, providing broad scope information to managers will help them to better understand the relation between input and output with a wider range of solutions to consider by those managers (Abernethy & Guthrie, 1994; Bouwens & Abernethy, 2000; Chenhall & Morris, 1986; Gordon & Miller, 1976).

In addition, Gordon and Narayanan (1984) and Mia (1993) found that besides other types of information, the managers give more importance to using broad scope information when they perceive great environmental uncertainty. Moreover, Chenhall and Morris (1986) proposed that management accounting systems that provide broad scope information will be perceived as useful by the managers of decentralized subunits, by those operating subunits with high levels of organizational interdependence, and by those who perceive their operating situation as uncertain. For example, many researchers (e.g., Chang et al., 2003; Chong, 1996, 1998; Romney & Steinbart, 2003) found that, under high task uncertainty, management accounting systems that provide broader information lead to effective managerial decisions, which, in turn, enhance managers' performance. In contrast, broad scope information under low task uncertainty leads to information overload, which causes the dysfunctional performance of managers.

Furthermore, the fit between contextual variables and management accounting systems information characteristics on managerial/organizational performance has been examined in many previous studies (e.g., Chong & Chong, 1997; Gul, 1991; Gul & Chia, 1994). For example, Gul (1991) found a positive effect for management accounting systems information characteristics on small business managers' perceptions of their performance in perceived situations of high environmental uncertainty. In contrast, in low perceived situations of environmental uncertainty, they have a negative effect. Also, Gul and Chia (1994) found that decentralization, broad scope and aggregated information availability are associated with higher managerial performance under high levels ofperceived environmental uncertainty. In contrast, under low levels of perceived environmental uncertainty, they are associated with lower managerial performance. In the mediating

model where broad scope information plays a mediating role between strategy, perceived environmental uncertainty and Strategic Business Unit (SBU) performance, Chong and Chong (1997) found that strategy and perceived environmental uncertainty have insignificant direct effects on SBU performance, while there are significant mediating effects for management accounting systems. As a result, they argued that SBU strategy and perceived environmental uncertainty are important antecedents of management accounting systems design, and management accounting systems broad scope information is an important antecedent of strategic business unit performance.

Furthermore, Mia and Chenhall (1994) found that the functional nature of organizational activities moderate the relation between the use of broad scope information and beneficial effects on managers' performance. They argued that the uncertainty facing the organizations differentiate all activities in this organization. Accordingly, they found that marketing managers that face the complexity of the decision-making environment benefit more than production managers when using broad scope information in improving their performance. Also, Chong (1996) [1998] found that, in conditions of high levels of task uncertainty "[low level of tolerance for ambiguity]",managerial performance was improved by using broad scope information. In contrast, in conditions of low levels of task uncertainty "[high level of tolerance for ambiguity]", broad scope information becomes dysfunctional. More recently, Chang et al. (2003) found that the performance of accounting information systems (AIS) can be improved when supplementing 'non-routine tasks' with broad scope information. Furthermore, the results of Chong and Eggleton (2003) reveal that in low task uncertainty conditions, the extent of use of broad scope information is detrimental to internal managers' performance, while it has no effect on the

level of external managers' performance. As a result, in low task uncertainty, internal managers performed less well than external managers when making more use of broad scope information for managerial decisions. In contrast, in conditions of high task uncertainty, when internal managers use broad scope MAS information for managerial decisions their performance will improve, while they are insensitive to the degree of use of broad scope information by external managers when they use it for managerial decisions. Finally, in prospector-type organizations, Abernethy and Guthrie (1994) found that there is a more positive effect for broad scope MAS information on SBU performance compared to defender-type organizations.

In summary, all the above contingency-based studies imply the idea that the existence of an appropriate fit between contextual variables and broad scope information is critical to enhance organizational/managerial performance.

2.2.2 Timeliness

Timeliness means the ability of management accounting systems to supply information on demand from systematically collected information (Chenhall & Morris, 1986). Accordingly, the timeliness of MAS is likely to influence a manager's ability to respond quickly to events. In addition, to control the daily operations, solve problems and identify opportunities for improvement in high task uncertainty situation, managers need more timely and frequent accounting information (Chang et al., 2003; Hilton, 1979; Simons, 1987). In contrast, Pizzini (2006) found that in USA hospitals the frequency of accounting information reports is not associated with hospital performance.

In addition, uncertainty is likely to be reduced by the timeliness of MAS information. Also, timeliness allows managers to continually adjust their activities when there are changes demanded by customization and when changes occur in other interdependent departments. In this situation, when exceptions are continually occurring, decision-making is not programmable because these exceptions require more frequent decisions. Therefore, this situation creates a need for more timely information to solve input/output problems immediately when they occur (Bouwens & Abernethy, 2000; Brignall, 1997). Moreover, Chia (1995) argued that timely information should ensure that the information is available for use before it loses its capacity to influence decisions. As updated reports from management accounting systems can help managers respond more quickly to any event, there is high probability that timely information has a positive effect on the performance of managers. Nevertheless, delay is inherent in the accounting information due to the historical nature of accounting, which means that accounting information only becomes available after transactions have been recorded and summarized (Nikias, Schwartz, & Young, 2005).

2.2.3 Aggregation

Due to the huge amount of information produced and the limited cognitive resources of its users, accounting information may be aggregated to a greater or lesser degree (Nikias et al., 2005). In addition, summarized information that covers periods of time or various management areas of interest, such as responsibility centres or functional areas, is provided by aggregation of information (Chenhall & Morris, 1986). Also, aggregated information allows managers to process a huge amount of information and concentrate it into a format that can be processed fast and which will lead to an increase in the amount of information

that can be processed within a given time. Furthermore, aggregation of information allows managers to develop a better understanding of input/output relations and consider more alternatives inside and between departments that will lead to an increase in the probability of creating solutions that are optimal for the organization (Bouwens & Abernethy, 2000).

Furthermore, Chia (1995, pp. 814-815) argued that, "The aggregated information concerns the application of either formal decision models or analytical models on summated information onto functioned areas or over different time periods". Also many researchers (e.g., Chenhall & Morris, 1986; Horngren, 1982; Iselin, 1988) stated that the potential information overload of the subunit managers can be reduced by using aggregated information. In addition, aggregated MAS information becomes useful when there is an increase in the degree of decentralization, because it reduces the information overload, which may face subunit managers during the decision-making process through providing important inputs to make their decisions. Also, since aggregated information depicts subunit managers respective areas of responsibility, it can further subunit managers' interests. Moreover, aggregated information that reflects the subunit managers' areas of responsibility and uses the performance evaluation process will be viewed as equitable. Therefore, highly decentralized organizations need highly aggregated MAS information, while low decentralized organizations need less aggregated MAS information (Chia, 1995).

In hospital context, Pizzini (2006) found that accounting systems are not assigning costs arbitrarily to different cost objects when they provide more detailed accounting information. In addition, hospitals achieve better performance when they have accounting

systems that provide more detail and classification abilities compared to all hospitals and their counterparts. In contrast, Hill (2000) argued that hospitals that have less detailed information may create incorrect choices, which, in turn, lead to a decrease in quality of care, net income, and affect hospital existence. Also, hospitals will be uninformed about the practice patterns of physicians and will be less able to argue their case for additional reimbursement when these hospitals do not shift to more sophisticated accounting systems.

2.2.4 Integration

The integration of information refers to the process of putting together data that crosses functional boundaries. Moreover, coordination of the various segments within a subunit is an important aspect of organizational control. Therefore, management accounting systems characteristics, which may assist coordination, would include the specification of targets, which account for the effects of interacting segments, and information on the impact that decisions in one area have on operations throughout the subunit (Chenhall & Morris, 1986). In addition, many researchers (e.g., Anthony, 1965; Baumler, 1971; Galbraith, 1973; Gordon & Miller, 1976; Thompson, 1967) have argued that when interdependencies grow, the importance of integrated management accounting systems information will increase due to its role in providing information for the coordination between interdependent subunits. Since, the integrated information from management accounting systems reflects subunits complexities and interdependencies (Ferrara, 1964; Horngren, 1982), organizations that have a great number of subunits will need highly integrated MAS information for coordination among interdependent subunits within the organization.

Furthermore, Williamson (1970) argued that organizational theory explains that there is a delegation of decision-making authority and the problem of control loss surfaces in decentralized organizations. In addition, Chia (1995) argued that integrated information in decentralized organizations coordinates the control of the diversity of decisions and when subunit managers making decisions affect other subunits, integrated information becomes useful. Moreover, as integrated information encourages learning and the generation of ideas, this information reduces the uncertainty relating to cause and effect relations within the departments of an organization. In addition, to be compatible with other departments, integrated information allows managers of departments to learn how to adjust products and production methods (Atkinson, Banker, Kaplan, & Young, 1997). Also, it provides a better understanding to managers about the different objectives that exist within separate decision units (Atkinson et al., 1997; Walton & Dutton, 1969) and it helps managers to make trade-offs among alternative ways to work within the given set of objectives (Bouwens & Abernethy, 2000).

2.3 THEORETICAL FOUNDATION OF THE STUDY

2.3.1 Contingency Theory

Contingency theory pioneers (e.g., Burns & Stalker, 1961; P. R. Lawrence & Lorsch, 1967, 1986; Thompson, 1967; Woodward, 1965) explained that contingency theory, in its elementary form, proposes that effective corporate performance will be achieved because of the existing appropriate fit between the organizational structure, the environment conditions, and technology. Burns and Stalker (1961) studied traditional Scottish industries and the problems in adopting electronics development work. They developed a continuum

of organization form as a result of this research. The continuum ranged from mechanistic (suitable when markets and technology are established, with little change over time) to organic (suitable when the environment is unstable, with much change). Lawrence and Lorsch (1967) refined the essence of contingency theory. They concluded that different market conditions and varied technologies require different kinds of organization. They also concluded that organizations that had to operate in uncertain or turbulent environments must develop higher levels of internal differentiation than those organizations that were operating in more stable environments.

In addition, contingency theory, a paradigm of organization theory research, provides perspective for the analysis of an organization's strategic, structural and management accounting and control system choices. The contingency approach is situated between two boundaries –universalistic and the situation-specific approach. The universalistic control approach is a natural extension of scientific management theory and its principles that only one best way exists to design operational processes in order to maximize efficiency. Extending this operational principal to management control systems implies that there must be one best control system that maximizes management effectiveness and that there is only one contingency setting that applies to all settings and firms. In contrast, the situation-specific approach argues that general rules and models cannot be applied because the factors affecting each control system are unique (J. G. Fisher, 1998).

The appropriateness of different control systems, according to contingency theory, depends on the setting of the business. However, in contrast to the situation-specific model, control system generalizations can be made for major classes (e.g., hospital sector) of business

settings (J. G. Fisher, 1998). A widely used contingency theory definition is that provided by Otley (1980). He stated that:

> *"The contingency approach to management accounting is based on the premise that there is no universally appropriate accounting system applicable to all organizations in all circumstances. Rather a contingency theory attempts to identify specific aspects of an accounting system that are associated with certain defined circumstances and to demonstrate an appropriate matching". (Otley, 1980, p.413)*

Furthermore, Chenhall (2003, p. 157) stated that, "The term contingency means that something is true only under specified conditions. As such there is no 'contingency theory', rather a variety of theories may be used to explain and predict the conditions under which particular MCS will be found or where they will be associated with enhanced performance". Hence the fundamental principle of contingency theory is that fit has a positive impact on performance due to certain combinations of management accounting systems and contingency factors. Consequently, it is assumed that both high and low performing companies exist because of more or less consistent combinations of organization's management accounting systems characteristics and contextual factors (Abernethy & Lillis, 2001; Anthony & Govindarajan, 2007; Chia, 1995; Devaraj & Kohli, 2000; J. G. Fisher, 1998; Gul & Chia, 1994; Perrow, 1967; Selto, Renner, & Young, 1995; Sharma et al., 2006; Simon, 2007). In addition, Fisher (1995) stated that the ultimate goal of contingent accounting research should be to develop and test a comprehensive model that includes multiple elements of accounting systems, multiple contextual variables, and multiple outcome variables.

In management accounting systems contingency-based research, three main forms of theoretical fit that have been used to classify these studies: selection, interaction and systems approach (Drazin & Van De Ven, 1985). Selection approach studies examine the way contextual variables relate to aspects of management accounting systems with no attempt to assess whether this association is linked to performance (e.g., Bouwens & Abernethy, 2000; Cardinaels et al., 2004; Chenhall & Morris, 1986; Chee W. Chow, Shields, & Wu, 1999; Davila, 2005; C. Fisher, 1996; Gerdin, 2005b; Gordon & Narayanan, 1984; Haldma & Lääts, 2002; Jusoh, Ibrahim, & Zainuddin, 2008b; Jusoh & Parnell, 2008; Khandawalla, 1972; Lal & Hassel, 1998; Libby & Waterhouse, 1996; Merchant, 1985; Moores & Yuen, 2001; Pavlatos & Paggios, 2009; Reid & Smith, 2000). Whereas, interaction approach studies examine how contextual variables moderate the relationship between management accounting systems and performance (e.g., Abernethy & Brownell, 1999; Abernethy & Guthrie, 1994; Agbejule, 2005; Chang et al., 2003; Chia, 1995; Chong, 1996; Davila, 2000; Gul, 1991; Gul & Chia, 1994; Hyvnen, 2007; Ittner & Larcker, 1997; Jusoh, Ibrahim, & Zainuddin, 2006; Jusoh & Parnell, 2008; J. Kim & Burton, 2002; K. K. Kim, 1988; Mia & Chenhall, 1994; Van der Stede, Chow, & Lin, 2006). Finally, systems approach studies consider the way in which multiple aspects of management accounting systems and dimensions of contextual variables combine in a variety of ways to enhance performance (e.g., Chenhall & Langfield-Smith, 1998; Govindarajan, 1988; Miles & Snow, 1978; Selto et al., 1995; Simon, 2007). Drazin and Van de Ven (1985) noted that these three forms of theoretical fit can provide both unique and complementary information about an organization because these forms are not mutually exclusive. Furthermore, Chenhall (2003) explained another form of theoretical fit that concerns

intervening variables. Many studies that used intervening form (e.g., Agbejule & Burrowes, 2007; Bouwens & Abernethy, 2000; Cadez & Guilding, 2008; Chenhall & Morris, 1986; Chong & Chong, 1997; Gordon & Narayanan, 1984; Hoque, 2004; Mia, 1993; Mia & Clarke, 1999; Soobaroyen & Poorundersing, 2008; Williams & Seaman, 2002) involved the specification of causal paths between management accounting systems, contextual variables and managerial/organizational performance.

A Cartesian-contingency-mediation approach, based on Gerdin and Greve's (2004) classification for forms of contingency fit, was tested because the main objective of current research is to provide a theoretical framework on contextual variables that influence the extent of use of management accounting systems information and the mediating role of management accounting systems information on the relationship between these variables and managerial performance. In the Cartesian approach, the fit between contextual variables and management accounting systems fall within a continuum. Moreover, in the contingency approach, due to certain combinations of contextual variables and management accounting systems, the fit is understood to signify a positive impact on performance (Cadez & Guilding, 2008). Finally, in the mediation approach, the management accounting systems is a mechanism that facilitates the indirect link between the contextual variables and managerial performance (Gerdin & Greve, 2004; Soobaroyen & Poorundersing, 2008; Venkatraman, 1989).

Finally, Wickramasingh and Alawattage (2007, pp. 398-402) considered the criticisms of contingency theory in two categories: conceptual and methodological.

(A). Conceptual Deficiencies

1. Most studies were limited by a few general contingencies, such as environment, structure, technology, etc.
2. Contingency variables are loosely defined, leading researchers to replicate what seminal writers found, rather than making a real contribution to knowledge.
3. Several terms are used interchangeably (e.g., MA, MAS, MCS, and AIS).
4. Most studies have not properly linked contingent explanations to organizational effectiveness.
5. The frameworks were non-theoretical in the sense that the relationships have not been explained in theoretical terms.

(B). Methodological Deficiencies

1. The predominant survey methods did not produce a deeper understanding of how organizations and their accounting systems react to contingencies.
2. Other than discovering whether a relationship is statistically significant or not, the method of cross-sectional data analysis can explain nothing.
3. Researchers look for linear and unidirectional relationships, which might not be the case in practice.
4. Studies provide prescriptions for managerial practice, assuming that hypothesis testing and cross-sectional data analysis are functionally useful for everyday practice, which is dangerous.
5. The results of contingency theory are still fragmentary and contradictory.

Although the contingency theory suffers from all the above deficiencies, they are widely researched and accepted, and well supported.

2.3.1.1 Contingency Factors

Chapman (1997) argued that the relationship between accounting systems and the contextual variables surrounding organizations is a worthwhile study in order to provide meaningful interpretation of accounting information. Moreover, an organization's accounting system is a significant element of its organizational structure and the particular features of an appropriate system will depend on the circumstances that the firm faces (Otley, 1980). In this context, Fisher (1998) identified five types of contingent factors:

1. Task and external environment uncertainty,
2. Firm technology and interdependence,
3. Industry, firm and unit variables, such as size, diversification and structure,
4. Competitive strategy and mission,
5. Behaviour and outcome observability.

In addition, using the contingency perspective, management accounting research has attempted to relate a variety of contingent factors with management accounting systems design and/or managerial/organizational performance, such as strategy (e.g., Abernethy & Guthrie, 1994; Boulianne, 2007; Werner Bruggeman & Van der Stede, 1993; Cadez & Guilding, 2008; Chenhall & Langfield-Smith, 1998; Jermias & Gani, 2004; Kald, Nilsson, & Rapp, 2000; Kober, Ng, & Paul, 2007; Pavlatos & Paggios, 2009; Simons, 1987; Snow & Hrebiniak, 1980), technology (e.g., Chenhall & Morris, 1986; Chong, 1996, 2004;

Chong & Eggleton, 2003; K. K. Kim, 1988; Soobaroyen & Poorundersing, 2008), organizational structure (e.g., Abernethy & Bouwens, 2005; Bouwens & Abernethy, 2000; Chia, 1995; Davila, 2000; Gerdin, 2005b; Jermias & Gani, 2004; Pizzini, 2006; Soobaroyen & Poorundersing, 2008), perceived environmental uncertainty (e.g., Agbejule, 2005; Agbejule & Burrowes, 2007; Chong & Chong, 1997; C. Fisher, 1996; Gordon & Narayanan, 1984; Govindarajan, 1984; Gul, 1991; Gul & Chia, 1994; Lal & Hassel, 1998), size (e.g., Cadez & Guilding, 2008; Davila, 2005; Haldma & Lääts, 2002; Pavlatos & Paggios, 2009), and culture (e.g., Awasthi, Chow, & Wu, 1998; Chee W . Chow, Harrison, Lindquist, & Wu, 1997; Chee W. Chow, Hwang, Liao, & Wu, 1998; Chee W. Chow, Kato, Merchant, & Kenneth, 1996; Chee W. Chow, Lindquist, & Wu, 2001; Chee W. Chow et al., 1999; Frucot & Shearon, 1991; Harrisson & McKinnon, 2007; MacNab & Worthley, 2007; Tsui, 2001; Van der Stede, 2003; Williams & Seaman, 2001). Most of these studies were done in the manufacturing sectors. However, similar studies seem lacking in the service sector, especially in the health care sector. Similar studies that have been conducted within the health context include: Abernethy and Brownell (1999), Abernethy and Lillis (2001), Cardinaels et al. (2004), Counte and Glandon (1988), Devaraj and Kohli (2000), Hill, (2000), Hill and Johns (1994), Kim (1988), Lawrence (1990), and Pizzini (2006).

For the purpose of the theoretical framework, four contextual variables were identified as having an influence on management accounting systems design in the hospitals sector: technology, organizational structure, perceived environmental uncertainty and organizational size. Due to their extensive coverage in management accounting systems literature in the manufacturing sector, these contextual variables were chosen even though

they have received little attention in the management accounting systems literature in the healthcare sector.

2.3.1.1.1 Technology

In organization behaviour, "technology" has many meanings. Technology generally refers to how the process of organisations works and operate, which includes people, knowledge, software, hardware and materials. From the organizational literature, three basic types of technology have been identified that are important to management accounting systems (MAS): task uncertainty, interdependence, and complexity (Chenhall, 2003; Otley, 1995; Ouchi, 1979; Perrow, 1970; Thompson, 1967; Woodward, 1965). As task complexity has a great influence on the degree of coordination required (Malone, 1987; Van De Ven, Delbeco, & Koenig Jr, 1976), more complex tasks may have higher uncertainty and greater information processing needs (Bensaou & Venkatraman, 1996). Whereas Perrow's (1967) definition of technology is based on the number of exceptions in the product or service generation process and the nature of the search process when exceptions are encountered. Moreover, Thompson (1967) stated that the interdependence among the organization's subunits is one of the key components of organization technology (Pooled, sequential and reciprocal interdependencies). Therefore, in this study, the researcher used task uncertainty and departmental interdependence as the main dimensions of technology because these dimensions are more suited to the characteristics of service organizations (e.g., hospitals). When a firm fails to match its technology with its structure, it does not succeed as a sustained organization (Wickramasinghe & Alawattage, 2007).

2.3.1.1.1.1 Task Uncertainty

Galbraith (1977) defined task uncertainty as, "The difference between the amount of information required to perform the task and the amount of information already possessed" (Chong, 1996, p. 416). In addition, as the main causes of uncertainty for the organization comprise task uncertainty and environmental uncertainty (Bensaou & Venkatraman, 1996), organizations pursue integration to increase information processing capabilities to face these types of uncertainties (Stock & Tatikonda, 2008; Van De Ven & Delbecq, 1974). Chapman (1997, p. 201) argued that the level of uncertainty may determine the role of accounting systems. In low levels of uncertainty, accounting systems work as answer machines, while in high levels of uncertainty these systems may become learning machines. For example, continual rethinking of diagnostic, treatment protocols, and clinical decision-making rules originate from continued advances in technology in hospitals. As a result, the rate of change and uncertainty will increase, consequently the specialization of function and competition among specialties will become great (Shortell, 1983). In this respect, in situations of high task uncertainty, Galbraith (1977, p. 36) suggested that when managers perform the task they must process large amounts of information to achieve the required level of performance.

To conceptualize task uncertainty, the current research adopts Perrow's (1967) routine and non-routine work characteristics. Organizational technology is described by Perrow (1967) as the actions employed to transform inputs into outputs. According to Perrow, task uncertainty has two basic dimensions; the first dimension is task variability, which refers to the number of exceptions or problems in the task, while the second one is task analysability, which refers to the difficulty of searching for solutions to problems,

therefore, high task analysability requires increased information exchange. Whereas task variability has an effect on the amount of information required to deal with unusual situations, task analysability influences the form of information necessary to resolve uncertainty (J. A. Ghani, 1992).

2.3.1.1.1.2 Departmental Interdependence

Chenhall and Morris (1986, p. 18) stated that, "Organizational interdependence refers to the exchange of output that takes place between segments within a sub-unit". Moreover, Thompson (1967) distinguished between three forms of interdependence –pooled, sequential and reciprocal. The lowest form is pooled dependence; in this form departments are relatively autonomous in that little work flows between them. While the sequential dependence form involves the outputs of one department becoming the inputs of another department, consequently, no department can work before receiving the input from the preceding department. Finally, the highest form of interdependence is reciprocal dependence; this form is characterized by the movement of work back and forth between departments.

When the organization is functionally structured, each subunit reflects just one link in the organization's value chain, and interdependencies will always exist between departments (Bouwens & Abernethy, 2000). In addition, increasing the level of departmental interdependency may generate uncertainty about objectives (Bouwens & Abernethy, 2000). This uncertainty happens because managers of departments face various and conflicting objectives and they must make trade-offs between their striving for achieving their own departmental objectives and other objectives pursued in other departments of the

organization (Thompson, 1967). In hospitals, the highest levels of task interdependence occur in inpatient settings (Pauly, 1996), for example, a team of physicians works together to perform a complex surgery or administer urgent care to a patient in an emergency room. Also, physicians in the hospital-based specialties of radiology and pathology coordinate with each other to process cases that come through their respective departments. Compared with inpatient settings, health care delivery in outpatient settings is much less task-interdependent. Even in outpatient settings, intra-group coordination has the potential to improve the collective output and quality, which, in turn, improves the group's reputation and increases the value of the partnership. In addition, physicians often consult with each other on cases to determine the best treatment plan (Pizzini, 2010).

Furthermore, many of accounting researchers (e.g., Bouwens & Abernethy, 2000; Chenhall & Morris, 1986; Gerdin, 2005a; Macintosh & Daft, 1987) concluded that increasing interdependency is a major challenge facing management accounting systems because it generates more information needs to ensure the coordination of work flows and facilitates decision-making within departments. For example, the empirical analysis done by Gerdin (2005a) provides evidence that the use of greater amounts of management accounting systems information (broad scope information) for decision-making plays an indirect mediating role through link departmental interdependence to subunit performance. Whereas, he found no evidence that the use of more frequent use of management accounting systems information plays a mediating role for the same relationship. He concluded that the effect of the use of greater amounts of management accounting systems information on subunit performance is significantly more positive in departments that have high levels of interdependence than other departments that have low levels.

2.3.1.1.2 Organizational Structure

A dictionary defines structure as, "The way in which individual parts or elements are arranged or put together to form a whole". Therefore, when designing organizational structure, "The parts are the basic building blocks of the organization that is the groupings of people into work units and the whole is the working relationships among these groups that collectively comprise a business" (Simons, 2000, p. 38). Also, Ghani, Jayabalan, and Sugumar (2002, p. 161) defined organizational structure as, "The formal allocation of work roles and administrative mechanism to control and integrate work activities".

Furthermore, managerial philosophy, in addition to the expectations and behaviour of organizational members, is reflected by organizational structure (Crank & Langworthy, 1992; Donaldson, 1987). Moreover, structure that reports relationships and job descriptions can influence the authorized or expected actions taken by the person (J. Fisher, 1995; Wickramasinghe & Alawattage, 2007). In organizations, two principal reasons motivate managers to impose structure: the first reason is to facilitate workflows that relate to the physical flow of materials and information. The second reason is to focus attention on where people focus their time and energy (Simons, 2000). Therefore, formulating management accounting systems to be consistent with the extent of organizational structure is the concern of management accounting systems designers. In addition, in organizational contingency research, the choice of structure has focused on the suitable structure to be consistent with the levels of environmental uncertainty (Drazin & Van De Ven, 1985). Moreover, as structure is an important control mechanism and was the

precursor of the contingency theory of management accounting, the contingency theory of organizational structure is important in the design of control systems (Otley, 1995).

Empirically, Pugh, Hickson, Hinings, and Turner (1968, 1969) identified many of the structure mechanisms that are commonly used in contingency studies. The examples of structure mechanisms include: specialization, standardization, formalization, configuration and centralization. First, "Specialization is concerned with the division of labour within the organization, the distribution of official duties among a number of positions" (Pugh et al., 1968, pp. 72-73). Second, standardization of procedures is the existence of rules purporting to cover all circumstances and invariably applied. Third, formalization determines what is written in the form of rules, procedures, instructions, and communications. Fourth, configuration is the shape of the role structure. Its data would be contained in a comprehensive and detailed organizational chart that includes literally every role in the organization. Finally, centralization refers to what level of position decision-making takes place. Moreover, the range of attention for unit managers in centralized organizations is narrow and senior managers want to ensure that information and events do not distract subordinates and pull their attention away from maximizing efficiency through specialization (Simons, 2000). In contrast, decentralization refers to the level of autonomy delegated to managers. In decentralized organizations the managers have greater responsibility over planning, control activities, and greater access to information not available to the corporate body (Bruns & Waterhouse, 1975; Waterhouse & Tiessen, 1978). In addition, these organizations are designed so that managers have wide spans of attention. Thus, when business strategy demands quick and agile responsiveness to customers and markets, decentralized organizations become essential and their business

units are market-based with employees of the unit interacting directly with customers and the markets (Simons, 2000). Table 2.1 summarizes the advantages and disadvantages of centralised and decentralised entities.

Furthermore, decentralized organizations have high ability to process information in greater depth (Mintzberg, 1979). In addition, decentralization choices are important for effective implementation of accounting innovations (Abernethy & Bouwens, 2005). In hospitals context, Abernethy and Lillis (2001) argued that a strategic focus on service innovation imposes the cognitive and coordinative demands, which, in turn, will influence the decision to delegate clinical and financial management to clinical units. Also, they argued that increasing the autonomy granted to clinical units over output and resource management decisions is best to meet the cognitive and coordinative demands. However, hospitals face less diversity, less change in their clinical mix, have fewer information requirements, and may not face the information constraints associated with a centralized structure when they do not pursue service innovation.

In addition, subunit managers in decentralized organizations have autonomy to make decisions that will affect the adaptability of their subunit. Also, the decentralization determines the degree of subunit managers' influence in the design of accounting systems. For example, subunit managers in centralized organization have insufficient authority to influence the design of accounting systems due to the centralized authority for making decisions. Therefore, this situation will predict resistance of subunit managers to the accounting changes and innovation (Abernethy & Bouwens, 2005; Hassan, 2005).

Table 2.1: Advantages and Disadvantages of Centralised and Decentralised Entities

Centralised entities		Decentralised entities	
Advantages	**Disadvantages**	**Advantages**	**Disadvantages**
▪ Less monitoring of decisions ▪ Decisions are intended to benefit the overall entity ▪ If decision makers have complete information, timely and efficient decisions are made ▪ Good for stable operations and economic condition	▪ More monitoring of employee effort because employees may be less motivated ▪ Decision makers may not have complete information, resulting in poorer quality decisions ▪ When knowledge from subunits is required the decision-making process slows down ▪ Not appropriate for dynamic processes and volatile economic conditions	▪ Timely decision making; appropriate for dynamic processes and unstable economic conditions ▪ Decision are made by individuals having the most knowledge and expertise ▪ Upper management has time to focus on organizational strategies ▪ Decision-making authority combined with reward systems provide more motivation to exert optimal effort at the subunit level	▪ Decisions may meet objectives of the decision maker's subunit, but not meet organizational goals ▪ Decision may not be coordinated among subunits. Resulting in less effective decision making for the organization as a whole ▪ Decision makers may not understand or agree with organizational strategies ▪ Lack of coordination among subunits may lead to duplication of products, services and effort

Source: Brooks et al., (2005, p. 452)

2.3.1.1.3 Perceived Environmental Uncertainty (PEU)

The environment was defined by Duncan (1972, p. 314) as, "The totality of physical and social factors that are taken directly into consideration in the decision-making behaviour of

individuals in the organization". Also, on page 318, Duncan defined Environmental uncertainty as:

> *"The lack of information regarding the environmental factors associated with a given decision-making situation, not knowing the outcome of a specific decision in terms of how much the organization would lose if the decision were incorrect, and inability to assign probabilities with any degree of confidence with regard to how environmental factors are going to affect the success or failure of the decision unit in performing its function". (Duncan, 1972, p.318)*

In addition, Duncan (1972) stated that although the list of environmental components presented in Table 2.2 is generally appropriate to the manufacturing sector it varies for other sectors. The list of environmental components in Table 2.2 comprises the internal and external environment of the decision unit. No decision unit is expected to identify all the components in its particular internal and external environment.

Moreover, some scholars (e.g., Daft, Sormunen, & Parks, 1988; Thompson, 1967) explained that organizations like open social systems need to adjust their inputs, processes and outputs to consist with external environment demands. Also, psychological decision theories and theories of organisational design (e.g., Duncan, 1972; Thompson, 1967) suggest that the important determinant of behaviour is the level of uncertainty faced by decision-makers. Thus, when the level of environmental uncertainty is high, organizations must survey the environment and search for information that analyses and interprets to decrease the level of uncertainty (Daft et al., 1988; Thompson, 1967).

In addition, a few years ago, healthcare and other industries were affected by environmental changes. There are many factors that cause environmental change including: changing customers, changing technology, changes in competitors, changes in economic structure and changes in regulatory structure (Granlund & Lukka, 1998; Kettelhut, 1992).

In management accounting literature, these changes may cause control problems and new decision making in the organizations (W. Bruggeman & Slagmulder, 1995). Therefore, management accounting systems in these organizations must be designed to fit with the control problems and new decision making to adapt to the changing environment (Chenhall, 2003). For example, in the Egyptian context, Hassab Elnaby et al. (2003) found a strong positive association that varies with time between accounting development and both economic and political factors (environmental factors).

In contingency-based studies, the external environment is a power contingent factor that is at the foundation of these studies (Otley, 1995). Also, in organization design, early contingency-based research spotlighted the effects of uncertainty on organizational structure. Hence, uncertainty may be the most widely researched aspect of the external environment (Chenhall, 2003). In order to plan and respond to changes in the environment under high environmental uncertainty, organizations are required to produce greater volumes and varieties of information about the future as well as about the past, about events within the organization and about external events in the environment (Libby & Waterhouse, 1996; Preston, 1995).

Table 2.2: The List of Environmental Components

Internal environment

(1) Organizational personal component
   A. Educational and technological background and skills
   B. Previous technological and managerial skill
   C. Individual member's involvement and commitment to attaining system's goals
   D. Interpersonal behaviour styles
   E. Availability of manpower for utilization within the system

(2) Organizational functional and staff units component
   A. Technological characteristics of organizational units
   B. Interdependence of organizational units in carrying out their objectives
   C. Intra-unit conflict among organizational functional and staff units
   D. Inter-unit conflict among organizational functional and staff units

(3) Organizational level component
   A. Organizational objectives and goals
   B. Integrative process integrating individuals and groups into contributing maximally to attaining organizational goals
   C. Nature of the organization's product service

External environment

(4) Customer component
   A. Distributors of product or service
   B. Actual users of product or service

(5) Suppliers component
   A. New material suppliers
   B. Equipment suppliers
   C. Product parts suppliers
   D. Labour supply

(6) Competitor component
   A. Competitors for suppliers
   B. Competitors for customers

(7) Socio-political component
   A. Government regulatory control over the industry
   B. Public political attitude towards industry and its particular product
   C. Relationship with trade unions with jurisdiction in the organization

(8) Technological component
   A. Meeting new technological requirements of own industry and related industries in production of product or service
   B. Improvising and developing new technological advances in the industry

Source: Duncan (1972)

Therefore, financial data in high environmental uncertainty is not sufficient to reflect managerial performance, but under low environmental uncertainty these data would be adequate (Drury, 2004, p. 699).

In accounting information system studies environmental uncertainty has been identified as an important contingent factor (e.g., Gordon & Miller, 1976) as well as in management information system design studies (e.g., Khandawalla, 1972; Waterhouse & Tiessen, 1978). Hoque (2004) argued that to enhance organizational performance in the organizations that have different operating environments and different strategic initiatives, different management information systems should be designed to achieve this goal.

Furthermore, trying to measure uncertainty, empirical research (e.g., Chenhall & Morris, 1986; Gordon & Narayanan, 1984) has used perceived environmental uncertainty rather than objectively (C. Fisher, 1996). In addition, Tymond, Stout, and Shaw (1998) provided recommendations, after reviewing management accounting systems studies that examined environmental uncertainty effects, to involve managers' perceptions of the external environment in the measures. In addition, many accounting studies connected environmental uncertainty to management accounting systems information characteristics (Agbejule & Burrowes, 2007; Chenhall & Morris, 1986; Chong & Chong, 1997; Lal & Hassel, 1998). For example, Chenhall and Morris (1986) showed evidence that the relationship between perceived environmental uncertainty and a need for management accounting systems information that has broad scope and timeliness is positive. Also, Mia's (1993) study revealed that perceived environmental uncertainty has a significant positive relationship with broad scope MAS information. Fisher (1996) examined the

interactive effect of perceived environmental uncertainty and the personality trait of managers' locus of control on their perceived usefulness of management accounting systems information. She hypothesized that as perceived environmental uncertainty increased, internals would perceive broad scope and timely information to be more useful than would externals.

Moreover, Chong and Chong (1997) found that both pursuing a prospector strategy and perceiving environmental uncertainty is positively associated with the use of broad scope MAS information. In addition, using data from 64 managers of New Zealand manufacturing companies, Lal and Hassel (1998) stated that the usefulness of management accounting systems information may be affected by the interaction patterns between the individual, organizational, and environmental levels. Moreover, when the environment is uncertain, they suggested that non-conventional management accounting systems information is perceived to be more useful by managers of large organizations with a high tolerance of ambiguity. In the hospital context, some studies (e.g., Hill, 2000; Kettelhut, 1992; Pizzini, 2006) found that a hospital's external environment influences accounting system functionality.

2.3.1.1.4 Hospital Size

Since the 1960s, size has been an important element in understanding the nature of organizational structures. The study by Pugh et al. (1969) is a notable one. They found that the size of the organization and its structure have a clear association. In particular, they concluded that large firms had much specialization, standardization, formalization, etc. In contrast, in small firms, the above features are less important, so they are less likely to be

highly structured and bureaucratic. This implies that firm size can create suitable management systems (Wickramasinghe & Alawattage, 2007, p. 389). For example, more formal controls are required by large organizations due to the increased complexity associated with a larger number of employees, which creates problems in communication, coordination, and social control. Whereas, more informal mechanisms, such as direct supervision and oral communications, are required to control small organisations (P. R. Lawrence & Lorsch, 1967).

Chenhall (2003) found that size has been considered as a contextual variable in a few management control systems (MCS) studies because the majority of management control systems (MCS) studies examined relatively large organizations. Moreover, many researchers (e.g., Haka, Gordon, & Pinches, 1985; Myers, Gordon, & Hamer, 1991; Shields, 1995) found that firm size is an important factor when considering the design and use of management control systems. In addition, numerous studies (e.g., Al-Omiri & Drury, 2007; Baker & Hall, 2004; Brown, Booth, & Giacobbe, 2004; Choe, 1996; Guilding, 1999; Libby & Waterhouse, 1996; Merchant, 1981, 1984) found that organizational size is positively related to accounting sophistication and control systems as the increase in organization size leads to increased communication and control problems, which, in turn, lead to accounting and control processes becoming more specialized and sophisticated (Burke, 2005; Hoque & James, 2000; Otley, 1995). In addition, the cost of information processing will become low when firm size increases (Guilding, 1999). For example, large hospitals will have the advantage of using more sophisticated accounting systems because these hospitals have the ability to allocate the fixed costs of system development on a large number of beds (Hill, 2000). In addition, two types of control

related with organizational size were identified by Bruns and Waterhouse (1975); the first type is administrative control with big organizations while the second type is personal control with small organizations. In this matter, based on empirical data collected from 1441 hospitals in USA, Wang, Wan, Burke, Bazzoli, and Lin (2005) found that there is a higher probability of large hospitals implementing administrative information systems compared to small hospitals.

Furthermore, in management accounting systems contingency research, the influence of organizational size has been controlled for despite the importance attributed to this variable as a determinant of organizational structure. Many researchers (e.g., Chenhall & Morris, 1986; Gordon & Narayanan, 1984; Yuen, 2006) have attempted to control for the confusing effects of organizational size. Gordon and Narayanan (1984) used medium sized organizations that were not subsidiaries of other organizations to control for the size effect. Moreover, Chenhall and Morris (1986) categorized subunits within organizations as small or medium based on the number of employees and used data from these subunits in data analysis. Also, to ensure that managerial behaviour was not affected by size, Yuen's (2006) study only included large hotels of similar size in the sample.

In the previous sections, the discussion covered all the independent variables (technology, organizational structure, perceived environmental uncertainty, organizational size). In the following section, the discussion on the dependent variable (managerial performance) and its association with both contextual variables and management accounting systems was presented.

2.3.2 Theory of Work Performance

Highly performing individuals are a very important part of any organization that plans to meet their goals, to deliver their products and services, and to achieve competitive advantage (Sonnentag & Frese, 2002, p. 4). Campbell with his colleagues (Campbell, 1990; Campbell, McCloy, Oppler, & Sager, 1993) provides the most commonly accepted theory of job performance. Furthermore, Campbell, McCloy, Oppler, and Sager (1993, p. 40) define job performance from a psychological perspective as "Performance is what the organization hires one to do, and do well".

In addition, there is a differentiation between performance and outcomes. Outcomes are the result of other influences besides an individual's performance. For instance, Campbell clarified that performance can consist of directly observable actions of an individual and mental productions such as decisions. Consequently, whether the performance is mental or behavioural, it needs to be under the individual's control. Consequently, job performance has to be goal relevant, it must be directed towards organizational goals that are relevant to the job and it does not include any activities where effort is expended towards achieving personal goals.

Blumberg and Pringle (1982, p. 562) argued that individual differences on performance are a function of three main dimensions:

1. Capacity to perform: this includes many variables, namely, ability, age, health, knowledge, skills, intelligence, level of education, endurance, stamina, energy level, motor skills.

2. Willingness to perform: which includes many variables, namely, motivation, job satisfaction, job status, anxiety, legitimacy of participation, attitude, perceived task characteristics, job involvement, ego involvement, self-image, personality, norms, values, perceived role expectations, feelings of equity.
3. Opportunity to perform: which includes many variables, namely, tools, equipment, materials, and supplies; working conditions; actions of co-workers; leader behaviour; mentorism; organizational policies, rules, and procedures; information; time; pay.

According to Blumberg and Pringle (1982, p. 565) performance is determined by capacity, willingness, and opportunity, and, in turn, it is a partial determinant of each. For example, the act of performing gives one experience on the job, which, over time, improves the individual's skills or abilities (capacity to perform). Consequently, high job performance increases a worker's job satisfaction and reduces his anxiety about performance (willingness to perform). As a result, the individual's excellent performance inspires his co-workers to perform better, which, in turn, forces the individual to still higher performance (opportunity to perform).

Furthermore, Borman and Motowidlo (1993) distinguished between task and contextual performance. Task performance refers to an individual's proficiency with which he performs activities that contribute to the organization's technical core. This contribution can be direct like production workers or indirect like managers or staff personnel. Whereas, contextual performance refers to activities that support the organizational, social, and psychological environment in which organizational goals are pursued. Moreover,

contextual performance makes suggestions about how to improve work procedures and includes behaviour such as helping co-workers or being a reliable member of the organization.

In addition, based on factor analytic research that attempts to capture dimensions of job performance existent across all jobs, Campbell (1990) suggested a model of performance that has eight factors:

1. Task specific behaviours that delineate one job from another, which include those behaviours that an individual undertakes as part of a job.
2. Non-task specific behaviours are those behaviours, which an individual is required to undertake and do not pertain to a particular job.
3. Written and oral communication tasks refer to activities where the incumbent is evaluated on the adeptness with which they deliver the communication.
4. An individual's performance can also be assessed in terms of effort, either day to day, or when there are extraordinary circumstances.
5. The performance domain might also include an aspect of personal discipline.
6. Performance may include, in highly interdependent jobs, the degree to which a person helps out the groups and his colleagues.
7. A supervisory or leadership component, as an aspect of performance, in many jobs happens in a face-to-face manner.
8. Managerial and administrative performance does not involve direct supervision but it entails those aspects of a job that serve the group or organization.

Some researchers (e.g., Campbell, Gasser, & Oswald, 1996; Motowidlo & Schmit, 1999) argued that task performance is multi-dimensional. There are five factors that refer to task performance among the eight performance components suggested by Campbell (1990) as explained above. These factors are: task specific behaviours, non-task specific behaviours, written and oral communication tasks, a supervisory or leadership component, and finally managerial and administrative performance. Each of these factors comprises a number of sub-factors that may vary between different jobs. For example, Borman and Brush (1993) explained that the managerial and administrative performance factor has sub-dimensions including: planning, organizing, guiding, directing, motivating subordinates, providing feedback, training, coaching, developing subordinates, communicating effectively, and keeping others informed.

In this study, task performance was used as a dimension of work performance and from task performance this study concentrates on the managerial performance factor and its sub-dimensions that are used to measure the performance of managers or heads of departments within Egyptian hospitals, when they were asked to rate their own perceived performance on eight sub-dimensions, namely: planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing.

2.3.2.1 Managerial Performance

First of all, the key expectation from management at the organisational and individual level is measuring and managing performance. Due to the various interpretations of its meaning "Performance" is a difficult word to define. For example, the term "Performance", in the case of management, may be used at the individual, team, or organisational level to reflect

a benchmark against peers and express general achievement (Brudan, 2010). Furthermore, managerial performance may have to be distinguished from the economic performance of the unit for which the manager is responsible. However, there is no clear-cut distinction between what is controllable and what is uncontrollable (Otley, 1995). In addition, Laitinen (2009) argued that the nature of managerial work (e.g., negotiating, recruiting, training, innovating, and contacting individual managers) strongly affects the importance of information, because each managerial work has specific information needs due to there being no ordered or systematic way to carry out these works. In addition, fragmentation in time and space, encounters with others, numerous interruptions, great variety, and brevity characterize these managerial works.

Furthermore, Chenhall (2003) argued that compelling theory is required, when using performance as a dependent variable, to explain how the combination of management accounting systems and contextual variables facilitate more effective decision-making by managers to enhance organizational performance. Moreover, Chenhall and Morris (1986) stated that:

> *"Perhaps, most importantly, the effect of different types of MAS on managers' performance should be investigated. It is hoped that such approaches will enhance our abilities to understand what types of MAS are appropriate in different situations and, as a result, to improve the likelihood that MAS will help managers improve their performance and that of their organizations". (Chenhall & Morris, 1986, p. 31)*

In addition, the conditional association assumes that providing better information by management accounting systems, as a major function of MAS, is to support managerial decision-making and control, and facilitate more effective managerial decisions, which, in turn, enhances organizational performance (Abernethy & Bouwens, 2005; Baines & Langfield-Smith, 2003; Chenhall, 2003). Furthermore, economic models of decision-making stated that in uncertain situations the provision of better information results in improved resource allocation and an enhanced positive outcome likelihood (Baines & Langfield-Smith, 2003). As a result, the relationship between management accounting systems and performance has been investigated by several empirical studies (Chenhall & Moers, 2007). Furthermore, many researchers (e.g., Abernethy & Bouwens, 2005; Baiman, 1982; Baiman & Demski, 1980; Tiessen & Waterhouse, 1983) argued that accounting information, in affecting the performance in organizations, can play two roles. The first role is a decision facilitation role that refers to the provision of information to managers before decision making to help them to decrease the uncertainty in decision problems (Demski & Feltham, 1976; Narayanan & Davila, 1998). The second role is a decision-influencing role that explains the usage of higher-level management for information to evaluate the performance of subordinate managers (Grafton, Lillis, & Widener, 2010). As providing managerial and accounting information to facilitate managers' decisions is the primary role of management accounting systems, accounting information in the form of periodic reports or special analyses is a source of information for decisions-making. Also, the characteristics of accounting information and the provision of that information for decision-facilitating purposes will improve the individuals' knowledge and ability to make better decisions (Sprinkle, 2003). In addition, previous empirical studies (e.g., Abernethy & Guthrie, 1994; Chong, 1998; Mia, 1993; Mia & Chenhall, 1994) found that the decision-

facilitating role of management accounting systems can enhance managerial performance when there is an appropriate fit between contextual variables and management accounting systems design.

In the developing counties context, the results of the study of Soobaroyen and Poorundersing (2008) showed that the relationship between management accounting systems information characteristics (scope, timeliness, aggregated, and integrated information) and managerial performance is positive. In prospector-type firms, Abernethy and Guthrie (1994) found that the relationship between the use of broad scope information and performance is significantly more positive than in defender-type firms. In addition, Chong and Chong (1997) found that prospector-type strategy induces managers to use broad scope information for decision-making. This finding implies that there is a mediating role for broad scope information between strategy and performance partially due to the indirect effect of extent of use broad scope information by managers for decision-making.

Furthermore, in many studies (e.g., Chong & Chong, 1997; Gul, 1991; Gul & Chia, 1994; Mia, 1993) the relationship between perceived environmental uncertainty and broad scope information on performance has been confirmed. Under high levels of perceived environmental uncertainty, Gul (1991) found that there is a positive effect for sophisticated MAS information on performance; however, under low levels of perceived environmental uncertainty it had a negative effect. Moreover, Mia (1993) found that the relationship between perceived environmental uncertainty and performance is mediated by the use of broad scope information. Mia (1993) stated that the managers used more broad scope information when their perceived environmental uncertainty increased because in high-

perceived environmental uncertainty situations, managers improve the accuracy of their decisions by using broad scope information to help them to gather information that is more useful. Furthermore, Gul and Chia (1994) showed that in high perceived environmental uncertainty situations, decentralization and the availability of both broad scope and aggregated MAS information were related to high managerial performance. While, in low perceived environmental uncertainty situations, they were related to low managerial performance. In addition, Chong and Chong (1997) found that high PEU induces managers, when they make decisions, to use broad scope information. This finding implies that there is a mediating role for broad scope information between perceived environmental uncertainty and performance partially due to the indirect effect of the extent of use of broad scope information by managers for decision-making.

In addition, many studies have provided evidence that sophisticated management accounting systems are positively associated with managerial/organisational performance (e.g., Abernethy & Guthrie, 1994; Baines & Langfield-Smith, 2003; Chong & Chong, 1997; Gul, 1991; Gul & Chia, 1994; Hoque & James, 2000; Ittner, Larcker, & Randall, 2003; Mahama, 2006; Mia & Chenhall, 1994; Mia & Clarke, 1999; Scott & Tiessen, 1999; Vandenbosch, 1999). Despite the relationship between sophisticated management accounting systems and managerial or organisational performance in some of these studies they are dependent on other contextual variables. For example, Gul (1991), and Gul and Chia (1994) found that the use of broad scope MAS has a strong positive effect on managerial or organisational performance under high environmental uncertainty situation. In addition, Abernethy and Guthrie (1994) only found the same results in prospector

organizations, while Mia and Chenhall (1994) only found the same results for marketing managers.

Furthermore, as the efficacy of management accounting systems is dependent on organizational contingent variables and its compatibility with mental models of managers, the accurate nature of accounting information and performance relationships is ambiguous (Baines & Langfield-Smith, 2003; de Haas & Algera, 2002). Some studies have determined that the relationship is negative or insignificant, for example, Ittner and Larcker (1997) found a negative relationship between many strategic control practices and performance. Also, Etemadi, Dilami, Bazaz, and Parameswaran, (2009) found that applied western countries' management tools and techniques for effective management performance in the Iranian context is not useful. Their results indicated that organizations that have different cultural, managerial performance in one organization may improve by management accounting tools and techniques, while in another organization the same management accounting tools and techniques may have a dysfunctional impact on managerial performance. In addition, using Simons' framework, some studies (e.g., Abernethy & Brownell, 1999; Bisbe & Otley, 2004) do not provide empirical evidence supporting the existing of a direct relationship between the interactive use of management accounting systems and performance.

2.4 SUMMARY

In this chapter, the literature review covered the area of the concept of management accounting systems, in particular, the characteristics of MAS information (scope, timeliness, aggregated, and integrated information) identified by Chenhall and Morris (1986). This was followed by the discussion on the contingency theory that underlines the research framework of this study. Inside the contingency framework, the literature review covered the contextual variables that form the theoretical model, namely, technology, organizational structure, perceived environmental uncertainty and organizational size. Finally, the work performance theory and managerial performance were discussed.

CHAPTER 3

THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 INTRODUCTION

The current research was conducted within the health care industry to investigate contingent variables, management accounting systems information and managerial performance relationships. The initial focus of this study was to determine factors that influence the extent of use of management accounting systems information. Furthermore, this study intended to determine the prominent dimensions of management accounting systems information that enhance performance in these hospitals. In addition, it intended to examine the mediating role of management accounting systems information between the research contextual variables and managerial performance. Finally, it intended to examine the effect of hospital size on the relationship between the research contextual variables, management accounting systems, and managerial performance. The insights into such relationships were provided in the literature concerning control systems and management accounting.

In the following section, the theoretical relationships between four contextual variables, management accounting systems and managerial performance are discussed. Also, eight main hypotheses are proposed concerning the relationships between the independent variables (technology, organizational structure, and perceived environmental uncertainty)

and management accounting systems information, the relationship between management accounting systems information and managerial performance, and the mediating role of management accounting systems information between contextual variables and managerial performance. Finally, the effect of hospital size on the relationship between the research contextual variables, management accounting systems information, and managerial performance are discussed.

3.2 THEORETICAL FRAMEWORK

In management accounting and control research, Drazin and Van de Ven (1985) argued that the contingency theory application is inevitable when examining the concept of fit where the underlying premise is that the contextual variables must somehow fit together to make the organization perform well. In addition, the adoption of a specific concept of fit is important to theory development, data collection procedures, and to determine which statistical analysis will be used.

In contingency-based research there are distinctions between two perspectives of fit: moderation and mediation perspectives. The moderation perspective is where the effect of an independent variable on a dependent variable is a function of the moderating variable (Venkatraman, 1989). On the other hand, mediation is where the effect of the independent variable, through the mediating variable, on the dependent variable operates completely or partially (Gerdin & Greve, 2004; Luft & Shields, 2003; Venkatraman, 1989). In contingency-based research, Chenhall (2003) argued that the moderation perspective is the dominant perspective in these studies. However, this perspective has been criticised in

recent literature. Therefore, the danger appears when researchers create arguments in intervening variable models about interaction effects. Furthermore, Gerdin and Greve (2004) argued that the theoretical meaning of moderation perspective is basically different from the theoretical meaning of the mediation perspective. Therefore, the results obtained from the moderation perspective cannot be validated with results based on the mediation perspective, whereas, if there are significant results from both perspectives, this should be interpreted as "contradictory", not the "converse".

In this study, the mediation perspective of fit was used, because, from the literature, it appears more reasonable that contextual variables (technology, organizational structure, perceived environmental uncertainty, and hospital size) are theoretically related to management accounting systems information. Despite using management accounting systems information as a mediator, in Egyptian hospitals context, institutional theory suggests that the quest of social legitimacy is the key to understand the role of accounting systems wherein these systems become as tools to document the compliance with institutional requirements. The theory also suggests that if the systems are not suitable, organizations still adopt them in order to comply with their constituents but not necessarily act upon these systems in decision-making (Hassan, 2005, p. 135). Consequently, based on institutional theory, this study predicts no mediating role for management accounting systems information on the relationship between the research contextual variables and managerial performance. In addition, this study response to what Hassan (2005, p. 136) claimed and asked for a deeper investigation to suggest that these systems are acted upon by organisational constituents to fulfil some hidden objectives (e.g., Egyptian hospitals may adopt new management accounting systems as tools for documenting institutional

compliance for the Egyptian government laws and legislations, that organize the health sector reform, to get external legitimating).

Based on the review of the literature, this chapter discussed the development of a theoretical framework for the research. This theoretical framework, as depicted in Figure 3.1, is based on insights of the contingency approach to management accounting systems design. In addition, to comply with Fisher (1995), who stated that the developing and testing of a comprehensive model that includes many elements of accounting systems, many contextual variables, and many outcome variables should be the ultimate goal of contingent accounting research.

The theoretical research framework depicts the relationships between many independent variables (technology, organizational structure, and perceived environmental uncertainty), many management accounting systems intervening variable elements (scope, timeliness, aggregation, and integration), and the dependent variable (managerial performance). Also, there are dimensions for technology that have two dimensions: task uncertainty and interdependence. In addition, organizational structure has one dimension, namely, decentralization.

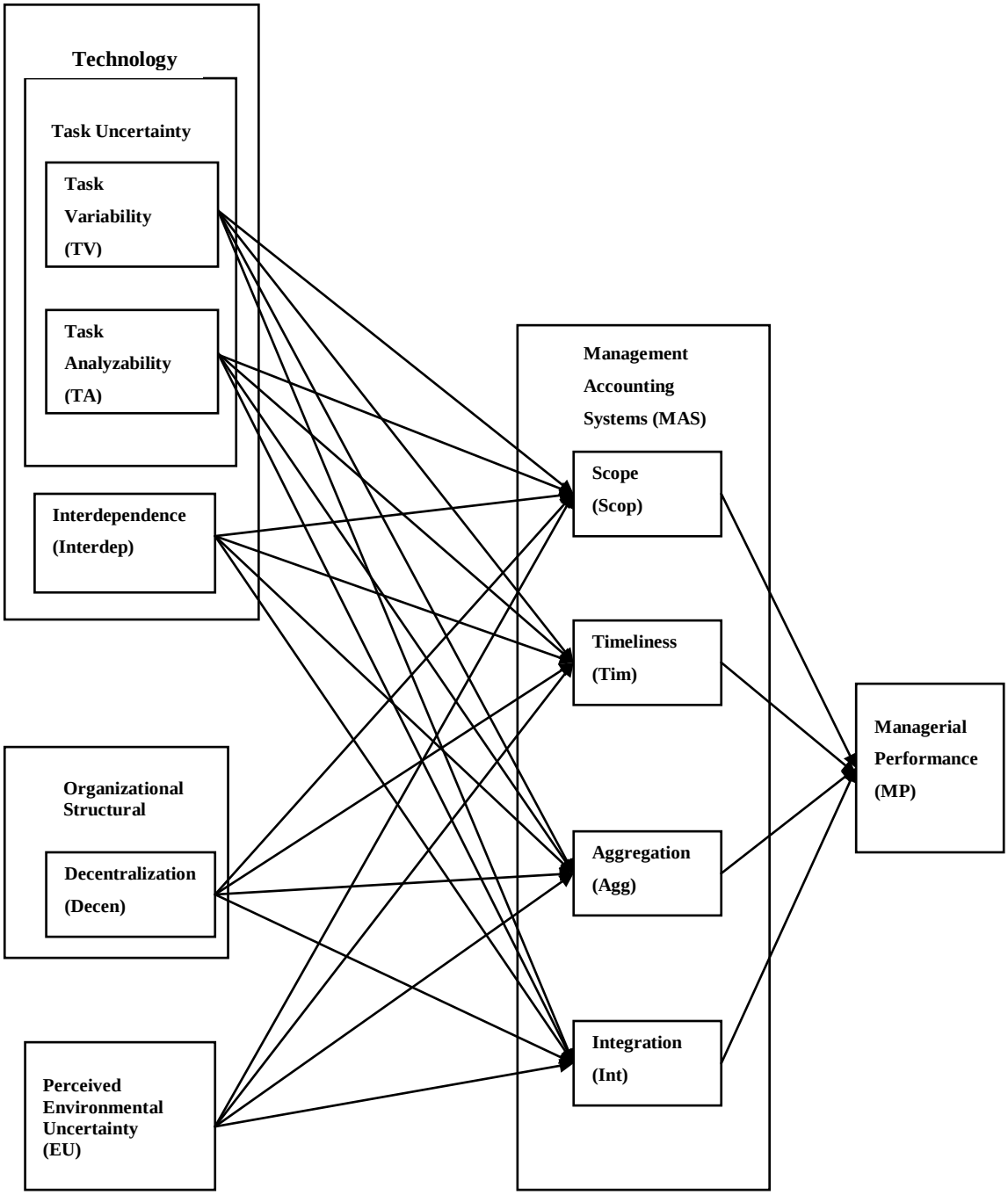

Figure 3.1: Theoretical Framework

Mowen and Hansen (2006, p. 5) stated that, "Regardless of the organizational form, managers must be able to use accounting information". Furthermore, management accounting information can help managers to identify important issues, solve problems,

and evaluate performance. Consequently, management accounting information is important in both for-profit and not-for-profit organizations, and it can be used in all organizations (e.g., manufacturing, merchandising, and service organizations) by using high quality relevant information and decision-making practices to achieve high quality decisions (Brooks et al., 2005, p. 2). Furthermore, Chenhall (2003) argued that managers should use control systems that are designed to help them to achieve both the organization goals and desired outcomes. Moreover, managers make different types of decisions (e.g., developing organizational strategies, creating operating plans, monitoring and motivating organizational performance) by using management accounting information (Anthony, 1989; Drury, 2000; Hussain & Gunasekaran, 2001).

Furthermore, health care literature (e.g., Hill & Johns, 1994; Pizzini, 2006) suggested using more sophisticated accounting systems to help the managers of hospitals to respond in this rapidly changing industry to growing pressure to control costs. Hence, Pizzini (2006) recommended that the opportunity be taken to sample from a large number of complex organizations that work under similar conditions and offer relatively standardized services, such as are available in the health care industry. Moreover, due to the increase in the importance of service and not-for-profit organizations in most economies, Chenhall (2003) suggested that there is a need for more contingency-based research into these entities. In response to the above arguments, it is necessary and timely that this study focuses on the Egyptian hospital sector, since the Egyptian services sector is growing rapidly and is the largest sector in terms of share in total gross domestic product (GDP), and also plays a principal role in the economy of Egypt(World Bank, 2008 *www.worldbank.org*).

Given the low use of sophisticated management accounting systems (MAS) and the large number and complexity of Egyptian hospitals, the proposed framework provides guidance for future empirical studies that will be conducted in Egyptian hospitals. As Abernethy and Lillis (2001) suggested in their study on Australian hospitals, as the Egyptian health care industry is still going through the process of reform, Egyptian hospitals present a suitable empirical setting whereby changes in the structural arrangements and strategic orientations can be observed, thereby contributing to the development of management accounting system design.

3.3 HYPOTHESES DEVELOPMENT

The research hypotheses were developed according to the research questions and objectives that were mentioned earlier. The eight sets of hypotheses were developed to answer research questions dealing with the relationships between contextual variables (technology, organizational structure, perceived environmental uncertainty, hospital size), management accounting systems (scope, timely, aggregated, integrated information), and managerial performance.

3.3.1 The Relationships between Contextual Variables (Technology, Organizational Structure, and PEU) and MAS Information

3.3.1.1 The Relationship between Technology and MAS Information

In the developing country of Mauritius, based on data collected from 75 companies in the manufacturing sector, Soobaroyen and Poorundersing (2008) found that the relationship between task uncertainty and aggregated MAS information is significant but negative. In addition, Daft and Macintosh (1981) provided support for the relationship between task variability and the amount of information processed being positive. Moreover, Specht's (1986) empirical result supported that complex, non-routine tasks with low analysability require less precise information and more information processing (broad scope MAS information) than simple and routine tasks.

Departmental interdependence was proposed as a second dimension of technology for this research. Gerdin (2005a) stated that the empirical research in the relations between interdependence and MAS is scarce, in spite of literature that explains that departmental interdependencies influence the shape and use of management accounting systems. For example, Chenhall and Morris (1986) found that high interdependence was associated with broad scope management accounting systems that focus on appropriate aggregations and integrative information. Meanwhile, Macintosh and Daft (1987) concluded that after examining the relationship between departmental interdependence and three elements of control, the role of the control systems reflect a fit between the need for information created by interdependence and the supply of information provided by the control system.

They found that departments emphasized standard operating procedures (indicating the use of narrow scope information) under conditions of pooled interdependence. While under conditions of sequential interdependence, departments emphasized budgets and statistical reports. Finally, departments de-emphasize formal control and emphasize more subjective forms of control (indicating the use of broad scope information) that are reciprocally interdependent.

More recently, using empirical data from 160 Sweden production managers, a study by Gerdin (2005b) provided evidence for existing relationships between departmental interdependence, organizational structure and management accounting systems design in manufacturing departments. They found that under conditions of sequential interdependence, broad scope MAS information was significantly over-represented among lateral units. Also, using empirical data from 132 Swedish production managers, another study done by Gerdin (2005a) indicated that when designing management accounting systems, the important factor to consider is departmental interdependencies.

Hence, based on the above arguments about the relationship between technology and management accounting systems information the following hypothesis was developed:
H1: there is a positive relationship between technology and the extent to which managers use management accounting systems (MAS) information

> *H1a: there is a positive relationship between task variability and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information*

H1b: there is a positive relationship between task analysability and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information

H1c: there is a positive relationship between interdependence and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information

3.3.1.2 The Relationship between Organizational Structure and MAS Information

Using data from twenty-five manufacturing and service organizations from USA and Canada, Bruns and Waterhouse (1975) found that large organizations with sophisticated technologies that are decentralized are associated with a strong emphasis on formal management accounting systems (budget-related behaviour). In addition, the ability to process information in greater depth by organizations will improve with decentralization (Mintzberg, 1979). Also, results of the path analysis by Chenhall and Morris (1986) imply that MAS integrated and aggregated information was only directly supported as useful with the degree of decentralization.

Moreover, a study by Mangaliso (1995) showed that the relationships between broad scope, timeliness of MAS information, and decentralization are insignificant. Only aggregation of information showed a relationship with decentralization through the interaction of perceived environmental uncertainty and decentralization. Recently, based

on data collected from eighty-three Australian production managers of manufacturing business units, Abernethy & Bouwens (2005) found that decentralization choices are important to effective implementation of accounting innovations.

Abernethy and Lillis (2001), in the hospital context, argued that the strategic focus on service innovation impose cognitive and coordinative demands, which, in turn, will influence the decision to delegate clinical and financial management to the managers' of clinical units. Also, they argued that the high autonomy delegated to the managers' of clinical units to make decisions related to both output and resource management decisions, is a best meet to the cognitive and coordinative demands. However, hospitals face less diversity, less change in their clinical mix, have fewer information requirements, and may not face the information constraints associated with a centralized structure when they do not pursue service innovation. More recently, in their study, Abdel-Kader and Luther (2008) showed that sophisticated management accounting practices (MAPs) are emphasized in firms that have a decentralized structure.

Hence, based on the above arguments concerning the relationship between organizational structure and management accounting systems information the following hypothesis was developed:

H2: there is a positive relationship between organizational structure and the extent to which managers use management accounting systems (MAS) information

H2a: there is a positive relationship between decentralization and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information

3.3.1.3 The Relationship between Perceived Environmental Uncertainty and MAS Information

Khandwalla (1972), based on empirical data collected from 92 CEOs of American manufacturing firms, found that there is a positive association between competition and the use of sophisticated management controls. According to Gordon and Miller (1976), accounting systems seem to incorporate more non-financial information (indicating broad scope information) as the level of dynamism and heterogeneity increases. In addition, Chenhall and Morris (1986) provided evidence that the relationship between perceived environmental uncertainty and both broad scope and timeliness of MAS information is positive. Also, Mia's (1993) study revealed that perceived environmental uncertainty has a significant positive relationship with broad scope MAS information. Moreover, Mangaliso's (1995) study showed that the relationships between management information characteristics (scope, timeliness, aggregation) and perceived environmental uncertainty are significantly positive. Fisher (1996) examined the interactive effect of perceived environmental uncertainty and the personality trait of managers' locus of control on their perceived usefulness of management accounting systems information. She hypothesized that as perceived environmental uncertainty increased, internals would perceive broad scope and timely information to be more useful than would externals. Moreover, Chong and Chong's (1997) study explained that both prospector strategy and PEU have a positive relationship with the use of broad scope MAS information. Lal and Hassel (1998) argued

that the interaction patterns between the individual, organizational and environmental levels might affect the usefulness of management accounting systems information. Based on data from 64 managers of New Zealand manufacturing companies, they suggested that when the environment is uncertain, managers of large organizations with high tolerance of ambiguity perceive sophisticated management accounting systems information to be most useful. In the Egyptian context, Hassab Elnaby et al. (2003) found a strong and positive relationship between accounting development and both economic and political factors (environmental factors). This relationship varies with time according to the economic reform and different stages of democracy in Egypt.

In the hospital context, some studies (e.g., Hill, 2000; Kettelhut, 1992; Pizzini, 2006) found that a hospital's external environment influences accounting systems functionality. In addition, hospitals that face greater external pressure to control costs require more extensive and detailed accounting information (indicating broad scope information) when operating in markets with strong competition and/or significant penetration from manage-care organizations (Hill, 2000; Kettelhut, 1992). Similarly, hospitals face greater external pressure to control costs when treating a large proportion of patients covered by Medicare or management-care plans, because these payers often impose the risk of cost overruns upon the hospitals using fixed-price reimbursement contracts. Therefore, to control costs, these hospitals may need sophisticated accounting systems that can provide more cost information detail, classify and report frequently (Pizzini, 2006). More recently, in contrast with previous studies, Pavlatos and Paggios (2009) conducted a study within the Greek hospitality industry and found no association between accounting systems functionality and the level of competition.

Hence, based on the above arguments about the relationship between perceived environmental uncertainty and management accounting systems information the following hypothesis was developed:

H3: there is a positive relationship between perceived environmental uncertainty and the extent to which managers use management accounting systems (MAS) information

H3a: there is a positive relationship between perceived environmental uncertainty and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information

3.3.2 The Relationship between MAS Information and Managerial Performance

As the aim of most managerial activities is to enhance the organizational performance (Davila, 2000), the relationship between management accounting systems and performance was investigated by several empirical studies (Chenhall & Moers, 2007). Some studies of management accounting systems (e.g., Bouwens & Abernethy, 2000; Chenhall & Morris, 1986; Chia, 1995; C. Fisher, 1996; Gordon & Narayanan, 1984) only examined the moderating effects of contingent variables, while management accounting systems influence on performance was not examined directly in these studies. However, other studies of management accounting systems that focused on mediating effects (e.g., Chong & Chong, 1997; Mia & Clarke, 1999; Soobaroyen & Poorundersing, 2008) explained the outcome effects, and provided some discussion on the direct positive effects of management accounting systems on strategic business unit/managerial performance. Mia

(1993) found that the relationship between management accounting systems scope and job satisfaction is negative, whereas he found a positive relationship to managerial performance. Mia (1993) did not impute these results to management accounting systems information, but to personal factors like salary and bonus or promotion. Under conditions of high decentralization, only Chia's (1995) study found that all MAS information characteristics (broad scope, timeliness, aggregation, and integration) have a positive effect on managerial performance. More recently, within the Mauritius context, Soobaroyen and Poorundersing (2008) found that the relationship between all MAS information characteristics (broad scope, timeliness, aggregations, integration) and managerial performance is significantly positive. They imputed these results to the new directions for Mauritius to benefit from sophisticated management accounting that provides timely, aggregated, and integrated information. In addition, their sample came from highly developed organizations in an export processing zone (EPZ)-style regime that seeks to compete outside of Mauritius.

In the context of USA hospitals, Pizzini (2006) found that hospitals achieve better performance when they have accounting systems that provide greater detail and classification capabilities compare to all hospitals and their peers. In contrast, hospitals that have less detailed information may create incorrect choices, which, in turn, lead to decreased quality of care, net income, and affect hospital existence. In addition, when these hospitals do not shift to more sophisticated accounting systems, they will be less able to justify to other parties the additional cost over normal contract budget and they will have less information about physicians activities (Hill, 2000).

Hence, based on the above arguments, the following hypothesis was formulated regarding the relationship between management accounting systems information and managerial performance:

H4: There is a positive relationship between the extent to which managers use management accounting systems (MAS) information and managerial performance.

H4a: There is a positive relationship between the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information and managerial performance.

3.3.3 The Relationship between Contextual Variables (Technology, Organizational Structure, and PEU), MAS Information, and Managerial Performance

3.3.3.1 The Relationship between Technology, MAS Information, and Managerial Performance

Galbraith (1977, p. 36) suggested that in order to achieve a given level of performance, decision-makers during task execution in situations of high task uncertainty must process a great amount of information. In addition, the importance of task characteristics and management accounting systems design on managerial performance has been of interest in many studies (e.g., Chang et al., 2003; Chong, 1996, 2004; Chong & Eggleton, 2003; Mia & Chenhall, 1994). For example, Mia and Chenhall (1994) found that the functional nature of organizational activities moderate the relation between beneficial effects on managers'

performance and using broad scope information. They argued that the uncertainty facing the organization differentiates all activities in the organization. Accordingly, they found that marketing managers, who are facing a complex decision-making environment, benefit more than production managers when using broad scope information in improving their performance. Also, Chong (1996) [1998] found that under high task uncertainty "[low level of tolerance for ambiguity]" conditions, managerial performance was improved by using broad scope information. However, under low task uncertainty "[high level of tolerance for ambiguity]" conditions, broad scope information becomes dysfunctional.

More recently, Chang et al. (2003) found that the performance of accounting information systems (AIS) can be improved when supplementing "non-routine tasks" with broad scope MAS information. Furthermore, the results of Chong and Eggleton (2003) reveal that in low task uncertainty conditions the extent of use of broad scope information is detrimental to internal managers' performance, while it has no effect on the level of external managers' performance. As a result, in low task uncertainty, internal managers performed less well than external managers when making more use of broad scope information for managerial decisions. In contrast, in high task uncertainty conditions, the performance of internal managers will improve by using broad scope MAS information for managerial decisions, while theyare insensitive to the degree of use of broad scope information by external managers when they use it for managerial decisions. Using empirical data collected from 75 manufacturing companies in Mauritius, Soobaroyen and Poorundersing (2008) found that MAS information characteristics do not mediate the relationship between task uncertainty and managerial performance.

In addition to task uncertainty, departmental interdependence was proposed for this research as a second dimension of technology. Bouwens and Abernethy (2000), using data collected from 170 production and sales managers in manufacturing and service companies in the Netherlands, found a positive indirect relation between customization and the MAS dimensions (scope, timeliness, aggregation, and integration) acting through departmental interdependence. They stated that to manage the interdependencies that stem from the pursuit of customization, managers recognize the importance of receiving information that is more sophisticated. Recently, based on data from 132 production managers in Swedish manufacturing organizations, Gerdin's (2005a) study indicated that the use of broad scope MAS information for decision-making mediates the relationship between departmental interdependence and subunit performance. While the more frequent use of MAS information does not play any mediating role between departmental interdependence and subunit performance.

Hence, based on the above arguments regarding the relationship between technology, management accounting systems information and managerial performance, the following hypothesis was developed:

H5: The extent to which managers use management accounting systems (MAS) information mediates the relationship between technology and managerial performance.

> *H5a: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between task variability and managerial performance.*

H5b: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between task analysability and managerial performance.

H5c: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between interdependence and managerial performance.

3.3.3.2 The Relationship between Organizational Structure, MAS Information, and Managerial Performance

Many researchers (e.g., Chang et al., 2003; Chia, 1995; Choe, 1998; Gul & Chia, 1994) found that managerial performance was associated with the interaction between decentralization and each of the MAS information characteristics. For example, based on empirical data collected from forty-eight Singaporean companies, Chia's (1995) results showed that in high decentralized organizations, the more sophisticated management accounting systems (broad scope, timely, aggregated, and integrated information) has a positive effect on managerial performance. In contrast, in low decentralized organizations, the more sophisticated management accounting systems has a negative effect on managerial performance.

Using the mediation perspective of fit, Soobaroyen and Poorundersing (2008) found that all management accounting systems information characteristics (broad scope, timeliness, aggregation, and integration) play a mediating role between decentralization and managerial performance. They concluded that only the availability of broad scope, timely,

more aggregated, and more integrated MAS information catalyse the decentralization policies to be effective on managerial performance.

Furthermore, many previous studies on the interaction effects of:

1. Perceived environmental uncertainty and decentralization on management accounting systems (e.g., Gul & Chia, 1994), of
2. Decentralization and management accounting systems on managerial performance (e.g., Chia, 1995), and of
3. Task uncertainty and management accounting systems on managerial performance (e.g., Chong, 1996, 2004)

These studies proposed that decentralization is required in high uncertainty situations; hence, more sophisticated management accounting systems information can help decrease uncertainty and improve managerial performance.

Hence, based on the above arguments regarding the relationship between organizational structure, management accounting systems information and managerial performance, the following hypothesis was developed:

H6: The extent to which managers use management accounting systems (MAS) information mediates the relationship between organizational structure and managerial performance.

> *H6a: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between decentralization and managerial performance.*

3.3.3.3 The Relationship between PEU, MAS Information, and Managerial Performance

Govindarajan (1984) stated that when environmental uncertainty is high, financial data only is not sufficient to evaluate managerial performance. Moreover, Gordon and Narayanan (1984) found that broad scope information (external, non-financial, and ex-ante information) is essential for decision makers in situations of high environmental uncertainty. In addition, using data collected from forty-two managers and owners of Australian light engineering manufacturing organizations, the results of Gul's (1991) study explained that in situations of high environmental uncertainty, sophisticated management accounting systems (broad scope, timely, aggregated, and integrated information) contribute to managerial performance (positive effect). In contrast, in situations of low environmental uncertainty, it hampers small business managers' performance (negative effect). He concludes that the effects of MAS on small business managers' performance were dependent on the level of perceived environmental uncertainty. Furthermore, Gul and Chia (1994) argued that more sophisticated MAS information can help to decrease uncertainty and improve managerial performance. Under situations of high environmental uncertainty, managers may require additional information to deal with the complexities of the environment, but under situations of low perceived environmental uncertainty, they are able to make relatively accurate predictions about the environment and market.

In addition, based on data collected from sixty-two managers of Australian manufacturing companies, Chong and Chong (1997) found that perceived environmental uncertainty has an insignificant direct effect on SBU performance, while there is a significant mediating effect for broad scope MAS information between perceived environmental uncertainty and

SBU performance. As a result, they argued that PEU is an important antecedent of management accounting systems design, and that broad scope information is an important antecedent of SBU performance. Also, using data collected from 61 business unit managers of Australian manufacturing firms, the results of Mia and Clarke (1999) imply that the use of MAS information by managers has a mediating effect on the relationship between market competition and business unit performance. Recently, Agbejule (2005) examined the moderating effect of perceived environmental uncertainty on the relationship between the use of management accounting systems and managerial performance. He found that the relationship between the use of MAS information (broad scope, timely, aggregated and integrated information) and managerial performance is significantly more positive in situations of high perceived environmental uncertainty. More recently, the results of Agbejule and Burrowes (2007) revealed that perceived environmental uncertainty is a determinant of supplier development, which, in turn, is a determinant of the use of broad scope MAS information. They argued that organizations in situations of high perceived environmental uncertainty form new purchasing strategies to become more flexible and proactive to cope with this situation. In addition, to cope with the diversity of information required in this situation, managers would use more broad scope MAS information.

Hence, based on the above arguments regarding the relationship between perceived environmental uncertainty, management accounting systems information and Managerial Performance, the following hypothesis was developed:

H7: The extent to which managers use management accounting systems (MAS) information mediates the relationship between perceived environmental uncertainty and managerial

performance.

H7a: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between perceived environmental uncertainty and managerial performance.

3.3.4. Effect of Hospital Size on the Relationship between Contextual Variables, MAS Information, and Managerial Performance

In prior research, firm size has often been posited as a determinant of MAS information. In addition, numerous studies (e.g., Al-Omiri & Drury, 2007; Baker & Hall, 2004; Brown et al., 2004; Choe, 1996; Guilding, 1999; Libby & Waterhouse, 1996; Merchant, 1981, 1984) found that organizational size is positively related to accounting sophistication and control systems, as the growth of organizations leads to an increase in communication and control problems, which, in turn, lead to more specialized and sophisticated accounting and control processes (Burke, 2005; Hoque & James, 2000; Otley, 1995). Also, the costs of information processing will become low when firm size increases (Guilding, 1999). For example, large hospitals have the advantage of using more sophisticated accounting systems because these hospitals have the ability to allocate the fixed costs of system development on the large number of beds (Hill, 2000).

In addition, Lal and Hassel (1998) argued that organizational size may increase the overall uncertainty that faces managers due to the increase in both the internal and external complexity of the organization. Consequently, managers will acquire the information they

perceive to be useful to respond to internal and external uncertainties. As a result, the importance of sophisticated MAS information characteristics of scope, timeliness, aggregated and integrated will increase when organizational size increases. Moreover, there is evidence that organizational size influences the control techniques in studies of the role of management control systems (MCS) in the organizations that make mergers or takeovers (e.g., Otley, 1995). The results of Choe's (1996) study showed that the correlation between the performance of accounting information systems and organizational size are significantly positive.

In addition, using data collected from twenty-four medium sized Canadian manufacturing organizations, Libby and Waterhouse (1996) found that there is a relationship between the organization size and the propensity for management accounting systems change, indicating that larger organizations have greater resources for change. Also, Luther and Longden (2001) found that the perceived benefits from management accounting systems increase with the size of the entity. In the transition countries, using empirical data collected from 62 respondents in larger Estonian manufacturing companies, Haldma and Lääts (2002) found that an increase in organization size leads to an increase in the sophistication level of management accounting systems. More recently, Cadez and Guilding (2008) found that firm size has a significant bearing on the successful application of strategic management accounting. Also, using data from 245 usable completed questionnaires from manufacturing companies in the UK, Abdel-Kader and Luther (2008) indicated that differences in management accounting sophistication are significantly explained by firm size. However, in contrast with prior studies, a study conducted within the Greek hospitality industry, found no association between accounting system

functionality and hotel size (Pavlatos & Paggios, 2009).

Harrisson and McKinnon (2007) argued that increased organizational size usually brings decentralized structuring of activities and more decision-making autonomy at lower levels in the organization, which requires a need for MAS broad scope, timely, aggregated and integrating information. Furthermore, due to large organizations having more resources to implement sophisticated management accounting systems than small organizations, organizational size is reported as an important factor that affects both structure and other control arrangements (Abdel-Kader & Luther, 2008; Libby & Waterhouse, 1996; Pugh et al., 1969). For example, based on data collected from 92 public non-profit hospitals in Thailand, Watcharasriroj and Tang (2004) found that large hospitals operate more efficiently compared to small hospitals.

Hence, based on the above arguments regarding the relationship between hospital size, management accounting systems information and managerial performance, the following hypothesis was developed:

H8: there is a positive effect for hospital size on the relationship between contextual variables (technology, organizational structure, and perceived environmental uncertainty), management accounting systems (MAS) information, and managerial performance.

3.4 SUMMARY

The conceptualization of the research framework based on both contingency and work performance theory that was explained in the previous chapter enabled the development of hypotheses for which the operational measurement of the various variables can be determined. The initial focus of the hypotheses development was to establish the relationships between:

1. Contextual variables (technology, organizational structure, and perceived environmental uncertainty) and management accounting systems information,
2. Management accounting systems information and managerial performance, and
3. Management accounting systems information as a mediator, contextual variables, and managerial performance, and
4. Hospital size's effect on the relationship between the contextual variables (technology, organizational structure, and perceived environmental uncertainty), management accounting systems information, and managerial performance.

CHAPTER 4

METHODOLOGY

4.1 INTRODUCTION

The current study was carried out using personally administered questionnaires in order to obtain cross-sectional data from Egyptian hospitals concerning the technology, organizational structure, perceived environmental uncertainty, hospital size, management accounting systems information, and managerial performance. Also, the methodology used to obtain the data and test the hypotheses created from the theoretical framework is described in this chapter. In addition, the initial focus of this chapter elaborates upon the research design undertaken encompassing the research scope, the procedures for sampling and data collection, and questionnaire design. This is followed by the discussion on the measurement of the research variables and the ways in which these variables have been operationalised for the purpose of this study. Finally, the statistical techniques that were used to test research hypotheses are described.

4.2 RESEARCH SCOPE

The main focal point of this study is management accounting systems that are conceptualized as the information characteristics (scope, timely, aggregated, and integrated information). The current study particularly attempts to investigate the contextual factors that influence the extent of use of management accounting systems information to enhance

managerial performance in Egyptian hospitals. Therefore, the sample came from hospitals where management accounting systems are reasonably important to enhance cost efficiency, allow hospitals through service line management to maximize their resources, and highlight opportunities for the continuous improvement of hospital operations (Ramsey, 1994). Also, the sample comprises different types of hospital (governmental, private, and semi-governmental) to obtain more valuable and varied information.

4.3 UNIT OF ANALYSIS

Chenhall (2003) stated that:

> *"The issue of levels of analysis is important to theory construction within contingency-based research. Care is required in maintaining consistency between the theory, the unit or level of analysis and the source of measurement.....If the theory includes both sub-unit and individual levels, then the sub-unit level of analysis can be preserved by splitting the existing sub-units into new sub-units based on different degrees of the individual level variable." (Chenhall, 2003, p.156)*

In this study, the unit of analysis was the departmental level, which can be preserved as Chenhall (2003) mentioned above. Accordingly, the justification for inclusion organizational structure as a contextual variable in this study, where the unit of analysis is a departmental unit, is the nature of hospitals context that differentiate from each other in their structure according to the kinds of diseases, the method of diagnosis, the protocol of treatment, and the level of medical technology. On the other side, in hospitals, heads or

managers of clinical units are generally physicians (Abernethy & Lillis, 2001, p. 111). Consequently, the organizational structure, as a contextual variable, is likely to vary with department head or manager's responsibilities.

4.4 SAMPLING DESIGN AND DATA COLLECTION PROCEDURE

Data for this study were collected using personally administrated questionnaires. The questionnaires were personally sent to the managers or heads of departments within Egyptian hospitals asking for their participation in this study. They are assumed to have diverse backgrounds, with experience, and varied responsibilities for the performance of their departments (Zajac & Shortell, 1989).

For this study, all hospitals listed in the Egyptian ministry of healthcare and population year 2008 (1849 hospitals) "(*Source: Arab Republic of Egypt: Central Agency for public Mobilization and Statistics (CAPMAS) www.capmas.gov.eg)",* were used as the population frame. Clinics without inpatient and rural hospitals were excluded because they may not have a real need for a sophisticated management accounting systems.

Notwithstanding the main advantages of mail survey, which include the wide geographical area that can be covered, high anonymity, and more time for the respondent to respond at convenience (Cavana et al., 2001, p. 245), many researchers (e.g., Harzing, 1997; Nasif, Al-Daeaj, Ebrahimi, & Thibodeaux, 1991) have argued that using mail surveys to collect data faces some difficulties. Generally, the low return rate for a mail-survey is common, especially in developing countries (e.g., Jusoh, Ibrahim, & Zainuddin, 2008a; Jusoh et al.,

2008b; Jusoh & Parnell, 2008; Soobaroyen & Poorundersing, 2008) and the Arab world (e.g., Mostafa, Sheaff, Morris, & Ingham, 2004). Parnell and Hatem (1999, p. 405) stated that, "Studies in Egypt that involve primary data collection through field surveys, interviews, and opinion polls often require special and tedious governmental permission".

In addition, Triest and Elshahat (2007, p. 340) stated that, "Unfamiliarity with questionnaires and tendency towards secrecy, this makes doing survey research in Egypt a daunting task". Moreover, they found none of the four criteria listed by Van der Stede, Young, and Chen (2005, p. 678) after reviewing survey quality in recent management accounting studies in the Egypt context. These criteria are (Triest & Elshahat, 2007, p. 341):

1. A population that has good access.
2. Uses a common language.
3. Willing to discuss a wide-range of subjects with strangers.
4. Trusts pledges of confidentiality.

Following Triest and Elshahat's (2007) study, using personally administered questionnaires as a mode of data collection, all 50 hospitals (34 governmental, 14 private, 2 semi-governmental) were visited personally to distribute the questionnaires to managers or heads of departments within these hospitals and collect the questionnaires after being completed by them. There were 200 responses (139 governmental, 55 private, 6 semi-governmental) obtained and used in the data analysis as shown in Table 4.1.

Table 4.1: Sample Details that Used in Data Analysis

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
1	Main Hospital, Tanta University (Governmental)	8	13	1- Urology. 2- Public Health 3- Internal Medicine 4- Paediatric 5- Ophthalmology 6- Cardiothoracic 7- Neurology & Psychiatry 8- Oncology and Radiotherapy
2	Ophthalmic Hospital, Tanta University (Governmental)	3	5	1- Vitero-Retina Departments 2- Cornea and Refractive Surgery Departments 3- Cataract and Glaucoma Departments
3	Students' Hospital, Tanta University (Governmental)	2	4	1- Surgeries 2- Urology
4	Emergency Hospital, Tanta University (Governmental)	2	8	1- Orthopaedics. 2- Radiology.
5	Mebra, Tanta (Governmental)	7	11	1- Obstetrics & Gynaecology. 2- General Surgery 3- Dermatology. 4- Anaesthesiology & Intensive care 5- Internal Medicine 6- Haematology, 7- Infectious disease
6	El Menshawy Hospital, Tanta (Government)	4	10	1- Physiotherapy 2- Paediatric. 3- Endocrinology 4- Cardiothoracic
7	Fever Hospital, Tanta (Governmental)	2	7	1- Infectious disease 2- Tropical disease.

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
8	Chest Hospital, Tanta (Governmental)	2	5	1- Chest Medicine 2- Pulmonology
9	Railroad Hospital, Tanta (Governmental)	3	9	1- Gastroenterology 2- Rheumatology 3- Radiology
10	El Muasah Hospital, Tanta (Governmental)	2	6	1- Obstetrics & Gynaecology 2- Paediatric.
11	Red Crescent, Tanta (Governmental)	4	10	1- Neurology & Psychiatry. 2- Urology. 3- Critical care 4- Endocrinology
12	Police Hospital, Tanta (Governmental)	3	8	1- General Surgery 2- Physiotherapy. 3- Anaesthesiology & Intensive care
13	Ophthalmic Hospital, Tanta (Governmental)	4	7	1- Oculoplasty Departments 2- Cataract & Glaucoma Departments 3- Vitero-Retina Departments 4- Cornea & Refractive Surgery Departments
14	El-Mahalla El-Kubra public Hospital, El-Mahalla El-Kubra (Governmental)	4	10	1- Infectious disease 2- Rheumatology 3- Ophthalmology 4- Gastroenterology
15	Kafr El Zayat Hospital, Kafr El Zayat (Governmental)	5	7	1- Dermatology. 2- Tropical disease 3- Radiology. 4- Nephrology 5- Paediatric

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
16	Mebra Hospital, Damanhour (Governmental)	3	9	1- Haematology 2- Clinical Pathology 3- Physiotherapy
17	Damanhour Teaching, Damanhour (Governmental)	4	11	1- Neurology & Psychiatry 2- Oncology & Radiotherapy 3- Radiology 4- Cardiology
18	Emergency Hospital, Munofya University (Governmental)	4	6	1- General Surgery. 2- Anaesthesiology & Intensive care 3- Internal Medicine 4- Radiology
19	Main Hospital, Munofya University (Governmental)	6	12	1- Chest Medicine 2- Hepatology 3- Orthopaedics 4- Oncology & Radiotherapy 5- Pharmacy 6- Laboratory and Clinical Pathology
20	Banha Hospital Teaching, Banha University (Governmental)	4	12	1- Surgeries 2- Cardiology 3- Critical Care 4- Neurology
21	Main hospital, Mansoura University (Governmental)	6	13	1- Rheumatology & rehabilitation 2- Urology. 3- Obstetrics & Gynaecology 4- Endocrinology 5- Internal Medicine 6- Interventional cardiology

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
22	Specialized Medical Hospital, Mansoura University (Governmental)	3	6	1- Diabetic and Endocrinology unit 2- Cardiovascular unit 3- Gastroenterology & Hepatology unit
23	Urology and Nephrology Center, Mansoura University (Governmental)	2	5	1- Kidney transplantation: 2- Paediatric urology:
24	Emergency Hospital, Mansoura University (Governmental)	4	7	1- Anaesthesiology & Intensive care. 2- Orthopaedics 3- Physiotherapy 4- General Surgery
25	Oncology Center, Mansoura University (Governmental)	2	6	1- Endocrinology 2- Radiology
26	Children's Hospital, Mansoura University (Governmental)	5	12	1- Paediatric Genetics 2- Intensive Care 3- Infection and Nutrition 4- Neonatology 5- Cardiology
27	Ophthalmic Center, Mansoura University (Governmental)	4	9	1- Oculoplasty 2- Cataract & Glaucoma Departments 3- Cornea & Refractive Surgery 4- Vitero-Retina
28	Kafr Elshekh Hospital, Kafr Elshekh (Governmental)	6	10	1- Ophthalmology. 2- Infectious disease 3- Nephrology 4- Urology 5- Gastroenterology 6- Rheumatology

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
29	Kasr El Aini (French) Teaching Hospital, Cairo (Governmental)	4	13	1- Enthalmology 2- Neurosurgery 3- Rheumatology & rehabilitation 4- Hematology unit
30	Old Kasr El Aini Hospital, Cairo (Governmental)	7	12	1- General Surgery 2- Critical care medicine 3- Haematology, 4- Clinical cardiac electrophysiology 5- Endocrinology 6- Neurology & Psychiatry 7- Anaesthesiology & Intensive care
31	Red Crescent, Cairo (Governmental)	5	8	1- Urology 2- Ophthalmology 3- Pharmacy 4- Hematology 5- Nephrology
32	Internal Medicine Hospital, Cairo (Governmental)	4	9	1- Gastroenterology 2- Infectious disease, 3- Clinical cardiac electrophysiology 4- Interventional cardiology
33	El Manyal Teaching Hospital, Cairo (Governmental)	7	12	1- Ear nose and throat 2- Cardiology 3- Critical care 4- Diagnostic imaging 5- General surgery 6- Maternity 7- Neonatal unit
34	Alexandria main University hospital (El Meery, koleyet el teb), Alexandria (Governmental)	5	13	1- Cardiology, 2- Neurology & Psychiatry 3- Critical care medicine 4- Ophthalmology 5- Endocrinology
	Total Governmental	***139***		

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
35	American Hospital, Tanta (Private)	4	7	1- Gastroenterology 2- Urology 3- Radiology 4- Internal Medicine
36	Ramadan Hospital, Tanta (Private)	5	6	1- General Surgery 2- Anaesthesiology & Intensive care 3- Orthopaedics. 4- Cardiology 5- Haematology
37	El Rehab Hospital, Tanta (Private)	3	5	1- Ophthalmology 2- Hospital medicine 3- Pharmacy
38	El Fadaly Hospital, Tanta (Private)	4	7	1- Accident and emergency 2- General surgery 3- Gastroenterology 4- Cardiothoracic
39	International Delta Hospital, Tanta (Private)	5	8	1- Obstetrics & Gynaecology 2- Neonatal unit 3- Anaesthesiology & Intensive care 4- Internal Medicine 5- Endocrinology
40	El Barbary Hospital, Tanta (Private)	3	5	1- Infectious disease 2- Urology 3- Adolescent medicine
41	Alexandria Medical Center (El Markaz El Tibbi), Alexandria (Private)	4	10	1- Vascular Lab 2- Emergency 3- Intensive Care 4- Rheumatology & rehabilitation

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
42	New Al-Salama Hospital, Alexandria (Private)	4	10	1- Surgeries 2- Orthopaedics 3- Diabetes and Endocrinology 4- Laboratory and Clinical Pathology
43	El Sherook Hospital, Tanta (Private)	5	7	1- Critical care medicine 2- Anaesthesiology & Intensive care 3- Gastroenterology 4- Rheumatology 5- Radiology
44	International Delta Hospital, Mansoura (Private)	4	8	1- Endocrinology 2- Haematology 3- Medical oncology 4- Pharmacy
45	El Salab Hospital, Mansoura (Private)	3	5	1- Emergency 2- Cardiothoracic 3- Radiology
46	Al Madinah Altebya, Tanta (Private)	4	7	1- Urology. 2- Obstetrics & Gynaecology 3- Dermatology 4- Internal Medicine
47	Aum El qura Hospital, Tanta (Private)	4	5	1- Cardiothoracic. 2- Anaesthesiology & Intensive care 3- Radiology. 4- Endoscopy
48	Raslan Hospital, Tanta (Private)	3	5	1- Obstetrics & Gynaecology 2- Internal Medicine 3- Geriatric medicine
	Total Private	***55***		

Continue

Table 4.1: Sample Details that Used in Data Analysis (Continued)

No.	Hospital's Name	Number of Questionnaires Distributed and Collected	Average Number of Departments	Type of Department's Heads/Managers
49	New Health Insurance Hospital, Tanta (Semi-governmental)	4	9	1- Internal Medicine 2- Nephrology 3- Clinical Pathology 4- Nutrition and dietetics
50	Special Hospital, Munofya University (Semi-governmental)	2	8	1- Oncology 2- Rheumatology
	Total Semi-governmental	***6***		

4.5 QUESTIONNAIRE DESIGN

A personally administered questionnaire was designed to obtain responses from managers or heads of departments within Egyptian hospitals about their perceptions concerning contextual variables (technology, organizational structure, perceived environmental uncertainty, and hospital size), the extent of use of management accounting systems information, and managerial performance. In addition, all items in the questionnaire were adapted from previous studies and modified to suit the hospital context (see section 4.6). Moreover, this study utilised the closed-ended response method, which allows the respondents to put their responses on a seven-point Likert scale by placing a tick against a specific statement. The preliminary draft of the questionnaire was discussed and edited for its clarity, applicability, and content validity with a number of faculty members and PhD students at the University of Malaya, Malaysia, and was revised before the final draft was formulated. The original version of the questionnaire was written in English, subsequently; this version was translated into Arabic (see Appendix B) and translated back into English

by different individuals. The two versions (original and back-translated) were compared and the differences were noted and resolved.

The personally administered questionnaire consists of seven main sections (see Appendix A). Section one consists of questions concerning management accounting systems information characteristics. The questions in section two were intended to obtain the respondents' opinion concerning the extent to which they agree with four items relating to the autonomy of clinical units. In addition, section three deals with a list of managerial performance indicators. This section was intended to obtain respondents' perception on their performance. Section four requires the respondents to indicate their perceptions on task uncertainty in their day-to-day management activities. The questions in section five relate to the respondents perception of the environmental uncertainty of their hospitals. The questions in section six deal with the respondents' perception of the cooperation between their departments and the other departments (departmental interdependence) in joint activities that they undertake with them. Lastly, questions concerning the general background and information of the participating departments of the hospitals were included in section seven.

4.6 MEASUREMENT OF RESEARCH VARIABLES

The research variables of this study consist of technology, organizational structure, perceived environmental uncertainty, hospital size, management accounting systems information, and managerial performance. Technology, organizational structure, perceived environmental uncertainty, and hospital size were treated as independent variables;

management accounting systems information was treated as the intervening (mediating) variable, while managerial performance was considered as the dependent variable. In the next section, the measurement and operationalization of these focal research variables are discussed in detail. In addition, the current study implemented variables and constructs that have been used in previous studies to provide an opportunity for reliable comparisons with the results obtained from these studies. Since hospitals have some unique features that are typically not observed in other industries (Eldenburg, 1994; Hariharan et al., 2004; Kohli & Kettinger, 2004), "scales used in manufacturing industries might have to be modified slightly to suit health care organizations and it would be advisable to test the validity and reliability again" (Cavana et al., 2001, p. 215).

4.6.1 MAS Information Characteristics

The managers' perceptions of the information characteristics of management accounting systems measured by Chenhall and Morris (1986) using a self-scoring instrument involving the extent to which a set of MAS information characteristics would be useful to managers for doing all the tasks in their subunit. A five-point Likert scale ranging from "not at all useful" to "most useful" was used.

Chia (1995) argued that the link between management accounting systems and managerial performance may not be provided by measuring perceived usefulness, because what is perceived as useful information by managers may not be what is available from the management accounting systems to them. Following Chia (1995), this study of management accounting systems instruments measured the perceptions of the managers or heads of departments within Egyptian hospitals regarding the characteristics of information

obtained from the management accounting systems (scope, timely, aggregated, and integrated information). In addition, the questionnaire includes nineteen items related to MAS information characteristics (scope, timeliness, aggregation, and integration). On a seven-point Likert type scale ranging from 1 (Never) to 7 (Always), respondents were asked to rate the extent of use of management accounting systems information available to them. Also, the measures for information characteristic were calculated by taking arithmetic averages of scores on those items. For doing descriptive analysis by using SPSS software (PASW Statistic 18.0.), averages were used to enhance the face validity of the characteristics to aid interpretation of the scores, which is consistent with previous studies that used this instrument (e.g., Chenhall & Morris, 1986).

Numerous management accounting studies used the instrument developed by Chenhall and Morris (e.g., Abernethy & Guthrie, 1994; Agbejule, 2005; Agbejule & Burrowes, 2007; Boulianne, 2007; Bouwens & Abernethy, 2000; Chang et al., 2003; Chia, 1995; Chong, 1996, 1998, 2004; Chong & Chong, 1997; Chong & Eggleton, 2003; C. Fisher, 1996; Gerdin, 2005b; Gul, 1991; Gul & Chia, 1994; Lal & Hassel, 1998; Linn, Casey, Johnson, & Ellis, 2001; Mia & Chenhall, 1994; Moores & Yuen, 2001; Sharma et al., 2006; Soobaroyen & Poorundersing, 2008; Tsui, 2001).

4.6.2 Technology

From the organizational literature, three basic types of technology were identified that are important to management accounting systems: task uncertainty, interdependence and complexity (Chenhall, 2003; Otley, 1995; Ouchi, 1979; Perrow, 1970; Thompson, 1967; Woodward, 1965). Due to the high bearing of task complexity on the degree of

coordination (Malone, 1987; Van De Ven et al., 1976), considerable information processing is required to deal with more complex tasks that may have higher uncertainty (Bensaou & Venkatraman, 1996). Perrow's (1967) definition of technology is based on the number of exceptions in the product or service generation process and the nature of the search process when exceptions are encountered. In addition, Thompson (1967) argued that the interdependence among the organization's subunits is one of the key components of organization technology (Pooled, sequential and reciprocal interdependencies). Therefore, in this study, the researcher used task uncertainty and departmental interdependence as the main dimensions of technology because these dimensions are more suitable to the characteristics of service organizations (e.g., hospitals).

Withey, Daft, and Cooper's (1983) instrument was used in this study to assess Perrow's dimensions of task variability and task analysability. Each dimension consists of five questions. Each question requires the respondents to indicate their perceptions on task uncertainty. It is ranked on a seven-point Likert type scale ranging from 1 (To a great extent) to 7 (To a small extent). For doing descriptive analysis by using SPSS software (PASW Statistic 18.0.), the researcher employed arithmetic averages of scores for the set of items for each dimension of task uncertainty (variability and analysability). Many previous studies used this instrument (e.g., Abernethy & Brownell, 1997; Chong, 1996, 2004; Chong & Eggleton, 2003; Hartmann, 2005; C. Kim, Suh, & Lee, 1998; K. K. Kim, 1988; Lau, Low, & Eggleton, 1995; Soobaroyen & Poorundersing, 2008) in various industries and it has shown high reliability and validity.

In addition to task uncertainty, Van De Ven, Delbeco and Koenig's (1976) instrument was used to assess departmental interdependence, which was proposed for this research as a second dimension of technology. Using a seven-point Likert type scale ranging from 1 (To a small extent) to 7 (To a great extent), respondents were asked to indicate the amount of work that fits into each category of interdependence (pooled, sequential and reciprocal). Moreover, some modification has been made to this instrument by making reverse code to measure pooled category by using a seven-point Likert type scale ranging from 1 (To a great extent) to 7 (To a small extent). In addition to doing descriptive analysis by using SPSS software (PASW Statistic 18.0.), and to be consistent with previous studies that used this instrument (e.g., Bouwens & Abernethy, 2000; Macintosh & Daft, 1987), this study used one scale in the analysis for interdependence, which represents the total workflow through putting both sequential and reciprocal interdependence items together. Many previous studies used this instrument (e.g., Bouwens & Abernethy, 2000; Gerdin, 2005a, 2005b; Macintosh & Daft, 1987) in various industries and it has shown high reliability and validity.

4.6.3 Organizational Structure

Similar to the study in the hospital context of Abernethy and Lillis (2001), the decentralization was measured based on Govindarajan's (1988) four-item instrument that focuses on the delegation of both input and output decisions. On a seven-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree), the extent to which these decisions had been delegated to the managers of clinical units were asked. For doing descriptive analysis by using SPSS software (PASW Statistic 18.0.), the decentralisation

was measured by taking the average for all four items (respondent's scores) relating to the autonomy of clinical units.

4.6.4 Perceived Environmental Uncertainty (PEU)

Duncan's (1972, pp. 318-319) instrument was used to measure PEU through three dimensions: "First, lack of information on environmental factors. Second, not knowing the outcome of a decision in terms of how much the firm would lose if the decisions were incorrect. Third, inability to assign probabilities with confidence as to how the environment will affect success or failure of a decision unit in performing its function?". Moreover, the Likert scale used to measures the frequency with which 12 items occur in the respondent's job.

Following Duncan (1972), the first dimension contains five scale items measured by using a seven-point Likert type scale ranging from 1 (Never) to 7 (Always), while the second dimension is composed of six scale items measured by using a seven-point Likert type scale ranging from 1 (Always) to 7 (Never). Respondents received an average score on each of the questions on the scales for the first and second dimensions. Finally, the third dimension has two components to the question that measures this dimension by using a ten-point Likert type scale ranging from 0% (Completely Sure) to 100% (Completely Unsure). The average of factors taken into consideration in decision-making, which may vary from individual to individual, was used as the respondent's total score for this question. Finally, the scores of the three dimensions of perceived environmental uncertainty are added to form a total uncertainty score for doing descriptive analysis by using SPSS software (PASW Statistic 18.0.). The rationale is that describing a general lack

of information about the environment is the aim of the concepts of these three dimensions. Many previous studies used this instrument (e.g., Brownell, 1985; Chenhall & Morris, 1986; Downey, Hellriegel, & John W. Slocum, 1975; C. Fisher, 1996; Kopp & Litschert, 1980; Linn et al., 2001; Ross, 1995) in various industries and it has shown high reliability and validity.

4.6.5 Hospital Size

Several ways have been used to estimate organization size, which include profits, sales volume, assets, and share valuation (Cadez & Guilding, 2008; Govindarajan, 1988; Larcker, 1981), however, comparisons between organizations by using these financial measures are difficult when different accounting treatments are used between organizations. Therefore, many contingency-based studies (e.g., Abernethy & Bouwens, 2005; Choe, 1996; Davila, 2005; Dossi & Patelli, 2008; Gerdin, 2005b; Govindarajan, 1988; Libby & Waterhouse, 1996; Merchant, 1981; Raymond, 1990) used the number of employees to define and measure organization size. However, Chenhall (2003, pp. 149-150) argued that both contextual variables and management control systems' dimensions in any study are important to determine the accurate measure of size. In the hospital context, the number of beds has been used in many studies (e.g., Abernethy & Brownell, 1999; Cardinaels et al., 2004; Carter et al., 2010; K. K. Kim, 1988; Pizzini, 2006) as a measure of hospital size. This study assessed hospital size using the number of beds because Egypt has a highly pluralistic and complex health care system as mentioned in Table 1.1, and these hospitals differentiate from each other according to the kinds of diseases (e.g., Ophthalmic Hospital, Fever Hospital, Chest Hospital, Children's Hospital... etc), the method of diagnosis, the protocol of treatment, and the level of medical technology. Consequently, using other

ways instead of number of beds will make the comparisons between hospitals very difficult. In addition, in this study, the construct for the size of the hospital was based on a single question relating to the number of beds in the hospital. Hence, there is no corresponding reliability value for this construct.

4.6.6 Managerial Performance

Through self-evaluation questions, managerial performance was measured using the instrument that was developed by Mahoney, Jerdee and Carrol (1963, 1965). On a seven-point Likert scale ranging from 1 (Well below average) to 7 (Well above average),the managers or heads of departments within Egyptian hospitals were asked to rate their own perceived performance on eight sub-dimensions, namely; planning, investigating, coordinating, evaluating, supervising, staffing, negotiating, and representing. Fordoing descriptive analysis by using SPSS software (PASW Statistic 18.0.), an overall score was calculated by averaging the eight sub-dimensions to measure for managerial performance. This is consistent with prior research by Tsui, (2001). In addition, many previous studies used this instrument (e.g., Abernethy & Brownell, 1997; Agbejule, 2005; Brownell, 1985; Chenhall & Morris, 1993; Chia, 1995; Chong, 1996, 1998, 2004; Chong & Eggleton, 2003; Gul, 1991; Gul & Chia, 1994; Lau et al., 1995; Sharma et al., 2006; Soobaroyen & Poorundersing, 2008; Tsui, 2001) in various industries and it has shown high reliability and validity.

4.7 DATA ANALYSIS TECHNIQUES

Chenhall (2003, p. 155) argued that, "Studies examining intervening models often use a combination of linear regression and simple correlations to identify paths between variables and then used these paths to decompose correlations of interest into direct and indirect effects". (For example, see: Agbejule & Burrowes, 2007; Bouwens & Abernethy, 2000; Cadez & Guilding, 2008; Chenhall & Morris, 1986; Chong & Chong, 1997; Gordon & Narayanan, 1984; Hoque, 2004; Mia, 1993; Mia & Clarke, 1999; Soobaroyen & Poorundersing, 2008; Williams & Seaman, 2002). "More recently, the powerful structural equation models, such as EQS, LISREL, AMOS and PLS, have been employed which enable latent variables to be constructed from multi-item questionnaires and to identify, simultaneously, statistical significance with multiple dependent variables" (for example see, Cadez & Guilding, 2008). Therefore, in order to act in accordance with recent approaches, the structural equation modelling (SEM), using partial least squares (PLS) was used for hypotheses testing.

PLS analysis was selected to analyse the overall model, to examine the mediation effect of management accounting systems information on the relationships between contextual variables (technology, organizational structure, and perceived environmental uncertainty) and the dependent variable (managerial performance), and to examine the effect of hospital size on the contextual variables, management accounting systems information, and managerial performance relationships as shown in the research model (Figure 4.1). PLS, as a scaled down version of model estimation and path analysis from SEM, utilizes the two-

step model estimation, measurement model, and structural model. PLS provides path coefficients, t-values and the R^2 to estimate the model fit.

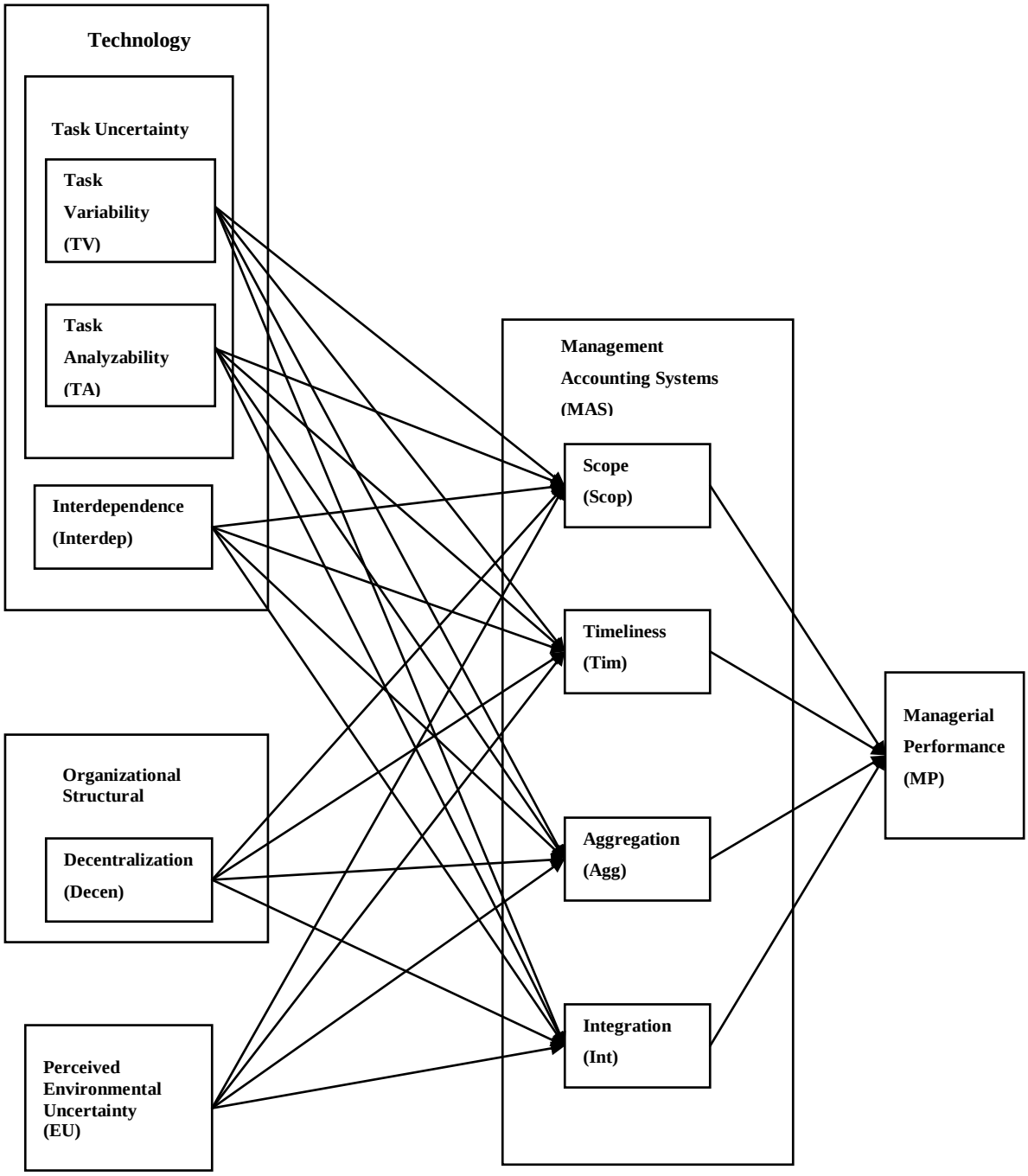

Figure 4.1: Dimensions of the Theoretical Model

In addition, PLS presents an average variance extracted (AVE) and composite reliability of all constructs estimated. In this section, the illustration of estimation methods is demonstrated, followed by more details on the measurement and structural model (two step modelling process).

4.7.1 Estimation

Partial least squares (PLS) utilizes a principal component based approach, thus, minimizing the required sample size (Chin & Newsted, 1999). In addition, the PLS approach can be used to model more complex situations when compared to covariance methods. This is also consistent with multiple regression analysis in that it gives β and R^2 statistics. PLS also allows researchers to put greater reliance on theory in analysing data when it is strong (Chin, 1998a, 1998b). According to Chin (1998), a significant advantage of using the PLS approach over the more traditional and familiar covariance-based methods relates to the minimal requirements needed by PLS for measurement scales, sample size and residual distributions. In addition, PLS do not assume multivariate normality in the data. Furthermore, the use of PLS is not new to the accounting literature (e.g., Ittner, Larcker, & Rajan, 1997).

For significance testing, the traditional parametric-based technique is not appropriate (Mahama, 2006), because in PLS the distributional properties of estimates are unknown (Chin, 1998b). While, in SmartPLS 2.0 M3 the significance of the regression coefficients and the reliability of the dataset were tested by using the bootstrapping procedure. In addition, bootstrapping creates new samples of the same size as the original data set by make a random re-sampling of the original dataset in order to estimate the error of the

estimated path coefficients (Chin, 1998b). Moreover, some researchers (e.g., Chin & Newsted, 1999; Hulland, 1999) stated that overall model fit statistics that are associated with covariance-based structural equation modelling are not appropriate because PLS is distribution free. Therefore, the stability of the model was assessed by using R^2. Also, the measurement and structural models were analysed and interpreted separately even though partial least squares simultaneously estimates the parameters for the two models (Hulland, 1999). The measurement and structural model applications for the current study are discussed separately in the following sections.

4.7.2 The Measurement Model

By assessing unidimensionality, the reliabilities of the constructs were demonstrated using Cronbach's alpha as well as composite reliabilities. A reliability level of 0.8 is desirable for the basic study while 0.7 is acceptable for the exploratory study (Hair, Anderson, Tatham, & Black, 1998). In addition, unidimensionality examines the modification indices, residuals, and overall fit indices. In addition, the assessment of each measure's convergent and discriminant validity or factor loadings of each item that is included in a construct examines the construct validity. Therefore, the average variance extracted (AVE) between the constructs that exceed 0.5 will achieve convergent validity. Moreover, discriminant validity will be examined by calculating the confidence intervals for the estimates of the inter factor correlations (Anderson & Gerbing, 1988; Bagozzi & Phillips, 1982).

4.7.3 The Structural Model

The relationships between latent variables are illustrated by the structural model, which provides the estimation of the path coefficients that act as standardized β weights in a

multiple regression analysis. The path coefficient of an exogenous latent variable means the direct effect of an endogenous latent variable. In addition, significant path coefficients in the model provides support for the hypothesized relationships (Bentler, 1989). The predictive value of the endogenous latent variables was evaluated by R^2 value, which determines the amount of variance explained by the model. The R^2 value varies between 0 and 1, so when R^2 is closer to 1 it means high variance is explained for the analysed variable. As reported in Camisón and López (2010, p. 867), "Falk and Miller (1992, p. 80) recommend a minimum value of 0.1, which ensures that at least 10 percent of the construct variability is due to the model".

4.8 SUMMARY

A cross-sectional data set from the Egyptian hospitals concerning the technology, organizational structure, perceived environmental uncertainty, hospital size, management accounting systems information, and managerial performance was obtained. In addition, the choice of research site, sampling design, and data collection procedures in the research methodology were explained. Also, the instruments used to measure the research variables were adapted from previous studies and past literature relating to management accounting systems, contingent variables, and managerial performance. This study used personally administered questionnaires as a mode of data collection. All 50 hospitals (34 governmental, 14 private, 2 semi-governmental) were visited personally to distribute the questionnaires to managers or heads of departments within these hospitals and collect the questionnaires after being completed by them. In total, 200 responses (139 governmental, 55 private, 6 semi-governmental) were obtained and used in the data analysis. Using SPSS software (PASW Statistic 18.0.), a series of relevant data analysis techniques were applied to conduct descriptive statistics. Finally, partial least squares (PLS) analysis was selected to analyse the overall model, to examine the mediation effect of management accounting systems information on the relationships between contextual variables (technology, organizational structure, and perceived environmental uncertainty) and the dependent variable (managerial performance), and to examine the effect of hospital size on the contextual variables, management accounting systems information, and managerial performance relationships in the research model.

CHAPTER 5

RESULTS

5.1 INTRODUCTION

The research model in Figure 4.1 highlights the relationships between all six variables: technology, organizational structure, perceived environmental uncertainty, hospital size, management accounting systems information and managerial performance. The relationships were tested by partial least squares (PLS) using SmartPLS 2.0 M3 (Ringle, Wende, & Will, 2005). Eight main hypotheses in sections 3.3.1 to 3.3.4 were tested, and the results are presented with path coefficients, t-values, and R^2 in the measurement and structural models. This chapter begins with a description of the sample characteristics, which is followed by presentation of the measurement and structural model. In addition, the results on the mediation effect of management accounting systems information on the relationships between independent variables (technology, organizational structure, and perceived environmental uncertainty) and the dependent variable (managerial performance) are presented. Finally, hospital size's effect on the relationships between research contextual variables, management accounting systems information and managerial performance are presented.

5.2 SAMPLE PROFILE

Frequency tests were used to obtain descriptive statistics on the general background information of the managers or heads of departments within the Egyptian hospitals. The results of the respondents' demographic profile are summarized, as explained in Table 5.1. This table provides the profile of respondents from hospitals that comprise a broad range of medical activities. The majority of the hospitals are governmental (34); followed by private (14); and semi-governmental (2). The respondents from the governmental hospitals were 139; private hospitals were 55 and semi-governmental hospitals were only 6. The majority of departments have a total number of beds of around 200 to 299 (43%) while those from departments with a total number of beds around 100 to 199 make up about 37.5% of the sample.

As can be seen from table 5.1, the information shows that the managers or heads of departments within Egyptian hospitals were quite experienced with 74.5% of them having been in the position for more than 10 years. Moreover, there were more male (85%) than female (15%) respondents. In addition, the age of the majority of respondents (71%) was more than 45 years. According to educational level, approximately 38.5% of the respondents held PhD degree and 36% Masters Degree.

Table 5.1: Profiles of Respondents (n = 200)

Variables	Category	Frequency (n = 200)	Percent
Number of respondents according to hospital ownership:	Governmental (34)	139	(69.5 %)
	Private (14)	55	(27.5 %)
	Semi-governmental (2)	6	(3.0 %)
Hospital size (number of beds):	50 - 99 beds	14	(7.0 %)
	100 - 199 beds	75	(37.5 %)
	200 - 299 beds	86	(43.0 %)
	300 - 399 beds	16	(8.0 %)
	400 - 499 beds	7	(3.5 %)
	500 -599 beds	0	(0.0 %)
	> 600 beds	2	(1.0 %)
Period of experience:	< 5 years	10	(5.0 %)
	5 - 10 years	41	(20.5 %)
	> 10 years	149	(74.5 %)
Gender:	Male	170	(85.0 %)
	Female	30	(15.0 %)
Age:	< 30	2	(1.0 %)
	30 - 45	56	(28.0 %)
	> 45	142	(71.0 %)
Educational level:	Bachelor's Degree	14	(7.0 %)
	Diploma	37	(18.5 %)
	Master' Degree	72	(36.0 %)
	PhD	77	(38.5 %)

5.3 DESCRIPTIVE STATISTICS

As shown in Table 5.2, descriptive and reliability statistics were calculated, by using SPSS software (PASW Statistic 18.0.), for contextual variables (technology, organizational structure, perceived environmental uncertainty, and hospital size), dimensions of management accounting systems (scope, timely, aggregated, and integrated information), and managerial performance. The descriptive table provides summary statistics, such as mean, minimum, maximum, standard deviation, and theoretical range. With a standard deviation between 0.403 and 1.250, the mean responses on the research variables are scattered around the range of 2.00 and 6.00. In addition, there are six variables showing a standard deviation of above 1.00, while the rest are less than 1.00, indicating more dispersion or variation of responses.

Among management accounting systems information characteristics, although the mean for timeliness is slightly lower than integration, it received a high variation in scores, whereas both scope and aggregated MAS information are lower than integration and timeliness. In addition, the highest score was for the use of integrated MAS information (mean = 4.635), then timeliness (mean = 4.416), scope (mean = 4.163) and aggregation (mean = 4.086). Moreover, the Cronbach's α coefficients, which measure the internal reliability, indicated that all the research variables exceed the acceptable level (0.60 or above) recommended by Nunnally (1978).

Table 5.2: Descriptive Statistics of Variables

Variables	Scale Reliability[a]	Theoretical Range	Actual Range	Mean	SD
Management Accounting Systems (MAS)	.863	1 - 7	1.68 - 6.63	4.270	0.814
Scope (Scop)	.722	1 - 7	1.67 – 7.00	4.163	1.092
Timeliness (Tim)	.789	1 - 7	1.00 – 7.00	4.416	1.250
Aggregation (Agg)	.773	1 - 7	1.29 - 6.57	4.086	1.012
Integration (Int)	.672	1 - 7	1.67 – 7.00	4.635	1.169
Technology (Tech)	.745	1 - 7	1.71 - 5.50	3.631	0.650
Task Variability (Tv)	.837	1 - 7	1.00 – 6.20	3.454	1.173
Task Analyzability (Ta)	.761	1 - 7	1.00 – 5.40	2.770	0.928
Interdependence (Interdep)	.639	1 - 7	2.33 – 6.33	4.693	0.888
Organizational Structure (OrgStruc and Decen)	.841	1 - 7	1.75 – 7.00	4.940	1.244
Perceived Environmental Uncertainty (PEU)					
Scale 1	.702	1 - 7	2.13 – 4.07	3.173	0.403
Scale 2	.782				
Scale 3[*]	NA				
Managerial Performance (MP)	.866	1 - 7	2.00 – 7.00	5.301	0.933
Hospital Size[**] **(Size)**	NA	1 - 7	1.00 - 7.00	2.67	0.932

Notes: n = 200; [a] Cronbach α

[*] Scale 3; one item

[**] Hospitals Size: 1= between 50 and 99 beds, 2 = between 100 and 199 beds, 3 = between 200 and 299 beds, 4 = between 300 and 399 beds, 5 = between 400 and 499 beds, 6 = between 500 and 599 beds, 7 = More than 600 beds.

5.4 HYPOTHESES TESTING

In this study, the results of the hypotheses testing are reported as follows:

1. Testing the relationships of contextual variables with management accounting systems information, and management accounting systems information with managerial performance
2. Testing the mediating effect of management accounting systems information on the relationships between contextual variables and managerial performance
3. Testing the effect of hospital size on the relationships between contextual variables, management accounting systems information, and managerial performance

The above hypotheses were tested using partial least squares (PLS), which was used to estimate the measurement and structural models. Due to its ability to model linear relationships without the constraints of other structural equation modelling, such as normality and large sample size that coordinates with estimated indicators (Chin, Marcolin, & Newsted, 2003), PLS has been increasingly used by management accounting systems researchers. Moreover, PLS simultaneously models the structural and measurement paths, also, in PLS, the algorithm allows each indicator to vary in how much it contributes to the composite score of the latent variable (Prasad, Heales, & Green, 2010). In this study, the sample size is 200 responses, which exceeds the minimum of 100 recommended in previous literature (e.g., Barclay, Thompson, & Higgins, 1995; Chin et al., 2003; Ko, Kirsch, & King, 2005), which represents 10 times the number of independent variables

influencing a dependent variable.

Furthermore, the PLS tests variables that are measured by psychometric scales and analyses the directions and strengths of the predetermined relationships. As in structural equation modelling (SEM), a two-step process is widely used in numerous studies that used PLS (e.g., Abernethy, Bouwens, & Lent, 2010; Chenhall, 2005; Cleary, 2009; Mahama, 2006; Naranjo-Gil, 2009a, 2009b; Naranjo-Gil & Hartmann, 2006, 2007; Naranjo-Gil, Hartmann, & Maasz, 2008; Salleh, Jusoh, & Isa, 2010). In the first step, the measurement model is estimated, much like factor analysis and tests of unidimensionality; in the second step, the structural model is estimated to provide path coefficients that illustrate the relationships of each construct. In the first step, the measurement model estimation provides factor loadings and reliability measures from items to latent constructs, whereas, in the second step, the structural model estimation illustrates the path coefficients for significant effects on the relationships between constructs. Different from SEM, the significance of path coefficients in PLS can only be estimated through a re-sampling method with bootstrapping or jack-knifing options. In this study, the bootstrapping method was used.

In PLS, either formative or reflective indicators model each latent construct. If the relationship is reflective, the construct is deemed to produce or cause the manifest variables (indicators), whereas if the relationship is formative, the manifest variables (indicators) are deemed to produce or cause the construct (Chin, Peterson, & Brown, 2008). In addition, Hulland (1999) argued that researchers face difficulties when deciding whether to use formative or reflective indicators for a particular construct. Therefore, the

researcher must have a clear understanding to correctly determine whether the construct causes the indicators (reflective relationship) or the indicators define the construct (formative relationship). In this study, all six exogenous and endogenous constructs were operationalized as reflective constructs that are reflected by each unmeasured indicator.

In the next sections, the results of the PLS analysis were obtained first from the overall model to examine the research's main hypotheses, and secondly from the model's dimensions to examine the research's sub-hypotheses.

5.4.1 Hypotheses 1, 2, 3, and 4: Relationships of Contextual Variables with MAS Information, and MAS Information with Managerial Performance

5.4.1.1 Assessing the Measurement Model for Theoretical Model

The relationship between measures and constructs was evaluated by the measurement model through assessing the scale measures' reliability and validity. In addition, individual item loadings and internal consistency of reliabilities were examined by using partial least squares (PLS), through examining the loadings of the items on their respective constructs. PLS estimates the loading parameters (e.g., the links between the items and constructs) and assigns them standardized values between 0 and 1, as shown in Appendix C 1, many items exceed the 0.70 loading level, which indicates that these items share more variance with their respective constructs than with error variance. Those items with loadings less than 0.70 were deleted.

Internal consistency was first assessed by examining Cronbach's alphas, which are influenced by the loadings of the items. The Cronbach's alphas are shown in Table 5.3. Consistent with the academic literature, the reliability of the constructs exceeded 0.70 in all. A second test of reliability known as Composite Reliability Index was also performed. This test is considered to be much more accurate than Cronbach's Alpha (Chin et al., 2003, p. 212) and its results are shown in Table 5.3. In addition, the constructs' composite reliability exceed the 0.70 level suggested by Nunnally (1978) and , as shown in Table 5.3, they range from 0.87 to 1.00.

Table 5.3: Reliability Assessment for Theoretical Model (Cronbach's Alphas and Composite Reliability Index, n = 200)

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Management Accounting Systems (MAS)	0.79	0.88	0.34	0.73
Managerial Performance (MP)	0.64	0.91	0.15	0.89
Organizational Structure (OrgStruc)	0.69	0.90		0.85
Perceived environmental uncertainty (PEU)	0.69	0.87		0.78
Technology (Tech)	1.00	1.00		1.00

The average variance extracted (AVE) was used to assess convergent validity. Chin (1998b) stated that average variance extracted (AVE) values of 0.50 or more are considered to reveal sufficient convergent validity. Table 5.3 explains that there is adequate convergent validity because the average variance extracted (AVEs) for all constructs exceeds 0.50. In addition, convergent validity exists when the t-values of the outer model loadings, that are equivalent to t-values in least squares regressions, are above 1.96. Table 5.4 shows the outer model loadings for the recommended model. The t-values

in all the convergent validity assessments are much greater than 1.96 indicating high convergent validity.

In addition, discriminant validity refers to the extent to which the measures of a given construct differ from other construct measures in the same model. In partial least squares, when the construct shares more variance with its measures than it shares with other constructs it means the model has adequate discriminant validity (Hulland, 1999). Moreover, Fornell and Larcker (1981) proposed using average variance extracted (AVE) to assess discriminant validity. This measure should be greater than the variance shared between the construct and other constructs in the model. This can be demonstrated in a correlation matrix, which includes the correlations between different constructs in the lower left off-diagonal elements of the matrix, and the square roots of the average variance extracted values calculated for each of the constructs along the diagonal. For adequate discriminant validity, the diagonal elements should be significantly greater than the off-diagonal elements in the corresponding rows and columns.

In the current study, the square roots of average variance extracted (AVE) were compared with the correlation between constructs to assess the extent to which a construct shares more variance with its measures than with other constructs in the research model. As shown in Table 5.5, the correlation matrix explains in the off-diagonal the correlation among constructs and, in the diagonal, the square root of AVE. Since all diagonal elements in the correlation matrix are greater than their respective off-diagonal elements, these are considered to demonstrate sufficient discriminant validity. Therefore, based on the above analysis, the measurement model of this study is reliable and valid.

Table 5.4: Outer Loadings for Theoretical Model (Mean, STDEV, T-Values, n = 200, Bootstrapping 500 samples)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen01 <- OrgStruc	0.837	0.835	0.026	0.026	32.402
Decen02 <- OrgStruc	0.734	0.732	0.039	0.039	18.683
Decen03 <- OrgStruc	0.890	0.890	0.017	0.017	53.478
Decen04 <- OrgStruc	0.847	0.847	0.021	0.021	39.733
Eu08 <- PEU	0.885	0.885	0.023	0.023	37.840
Eu09 <- PEU	0.830	0.829	0.035	0.035	23.874
Eu10 <- PEU	0.773	0.770	0.048	0.048	16.157
MP01 <- MP	0.813	0.811	0.031	0.031	26.426
MP02 <- MP	0.805	0.801	0.033	0.033	24.066
MP03 <- MP	0.770	0.767	0.040	0.040	19.106
MP04 <- MP	0.800	0.799	0.029	0.029	27.786
MP05 <- MP	0.787	0.784	0.042	0.042	18.918
MP08 <- MP	0.829	0.828	0.027	0.027	30.637
MasAgg10 <- MAS	0.900	0.899	0.019	0.019	48.075
MasTim06 <- MAS	0.872	0.872	0.027	0.027	32.445
TuTa09 <- Tech	1.000	1.000	0.000		

Table 5.5: Inter-Construct Correlations, Average Variance Extracted (AVE), and Square root of AVE for Theoretical Model (n = 200)

	AVE	Composite Reliability	MAS	MP	OrgStruc	PEU	Tech
MAS	0.79	0.88	**0.89**				
MP	0.64	0.91	0.39	**0.80**			
OrgStruc	0.69	0.90	0.47	0.23	**0.83**		
PEU	0.69	0.87	-0.44	-0.62	-0.22	**0.83**	
Tech	1.00	1.00	-0.30	-0.35	-0.37	0.38	**1.00**

5.4.1.2 Assessing the Structural Model for Theoretical Model

The structural model was assessed by estimating the path coefficients and R^2 value. Path coefficients indicate the strengths of the independent and dependent variables relationships, while the predictive power of a model for the dependent variables is measured by R^2 value (Chin et al., 2003; Ko et al., 2005). In addition, significant path coefficients provide support for the hypothesized relationships (Bentler, 1989).

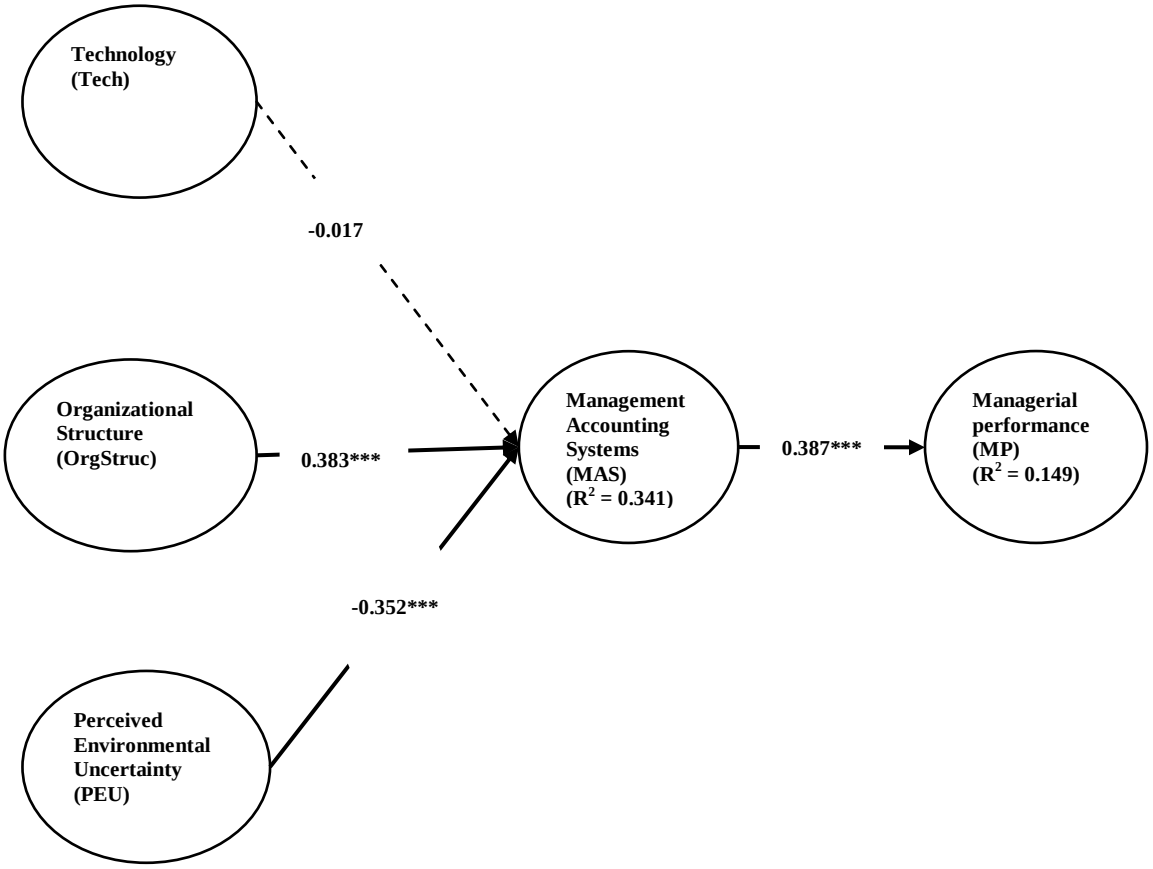

Figure 5.1: PLS Results for Theoretical Model

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

In this study, the significance of the paths within the structural model was determined by using a bootstrap re-sampling method (500 re-samples). Figure 5.1 shows the overall

results of the analysis. According to Chin et al. (2003) standardized paths, in order to be considered meaningful, should be at least 0.20 and ideally above 0.30.

Table 5.6: Path Coefficients (Mean, STDEV, T-Values, n = 200) for Theoretical Model

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
MAS -> MP	0.387	0.395	0.047	0.047	8.162
OrgStruc -> MAS	0.383	0.387	0.058	0.058	6.585
PEU -> MAS	-0.352	-0.354	0.065	0.065	5.433
Tech -> MAS	-0.017	-0.018	0.060	0.060	0.281

As shown in Figure 5.1 and Table 5.6, technology has insignificant relationship with management accounting systems (β = -0.017, $p > 0.05$). This result indicates that the process of Egyptian hospitals, which includes people, knowledge, software, hardware and materials not influence the extent of use of management accounting systems information. Accordingly, the main hypothesis H1 is not supported. In addition, there is a significant and positive relationship between organizational structure and management accounting systems information (β = 0.383, $p < 0.001$). This result shows that the way in which individual parts or elements in Egyptian hospital arranged has a positive influence on the extent of use of management accounting systems information. Based on this result, the main hypothesis H2 is supported. Moreover, the relationship between perceived environmental uncertainty and management accounting systems information is significant and negative (β = -0.352, $p < 0.001$). This result reveals that perceived environmental uncertainty has negative influence on the extent of use of management accounting systems information. Consequently, the main hypothesis H3 is not supported. Finally, the

significant and positive path between management accounting systems information and managerial performance ($\beta = 0.387$, $p < 0.001$) indicates that management accounting systems information provides motivation to Egyptian hospitals' managers to enhance their performance. Based on this result, the main hypothesis H4 is supported.

Figure 5.1 indicates 0.34 % of the variance in management accounting systems information ($R^2 = 0.341$), and 15 % of the variance in managerial performance ($R^2 = 0.149$). In addition, as mentioned by Chin (1998a), 3 of the 4 standardized path coefficients greater than 0.20 as a minimum value to be meaningful (the range of these paths was between -0.352 to 0.387). These 4 paths presented t-values ranging from 5.433 to 8.162 that all reached at least a 0.05 significant level (see Table 5.6). Moreover, all significant constructs display strong positive loadings and high levels of statistical significance for all items (see Tables 5.4 and 5.5).

5.4.1.3 Assessing the Measurement Model for Theoretical Model's Dimensions

As shown in Appendix C 4, many items exceed the 0.70 loading level, which indicates that these items share more variance with their respective constructs than with error variance. Those items with loadings less than 0.70 were deleted.

The Cronbach's alphas are shown in Table 5.7. Consistent with the academic literature, the reliability of the constructs exceeded 0.70 in all except three of the constructs, namely, integration (0.61), interdependence (0.68), and task analysability (0.62). In addition, the constructs' composite reliability exceed the 0.70 level suggested by Nunnally (1978) and ,

as shown in Table 5.7, they range from 0.83 to 0.92.

Table 5.7: Reliability Assessment for Theoretical Model's Dimensions (Cronbach's Alphas and Composite Reliability Index, n = 200)

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Aggregation (Agg)	0.63	0.84	0.42	0.71
Decentralization (Decen)	0.69	0.90		0.85
Integration (Int)	0.71	0.83	0.26	0.61
Interdependence (Interdep)	0.75	0.86		0.68
Managerial Performance (MP)	0.64	0.92	0.32	0.89
Perceived environmental uncertainty (PEU)	0.70	0.87		0.78
Scope (Scop)	0.81	0.90	0.30	0.78
Task Analyzability (Ta)	0.72	0.84		0.62
Timeliness (Tim)	0.61	0.86	0.46	0.79
Task Variability (Tv)	0.81	0.89		0.77

Table 5.7 explains that there is adequate convergent validity because the average variance extracted (AVE) for all constructs exceeds 0.50. In addition, as shown in Table 5.8, the t-values in all the convergent validity assessments are much greater than 1.96 indicating high convergent validity.

As shown in Table 5.9, the correlation matrix explains in the off-diagonal the correlation among constructs and, in the diagonal, the square root of AVE. Since all diagonal elements in the correlation matrix are greater than their respective off-diagonal elements, these are considered to demonstrate sufficient discriminant validity. Therefore, based on the above analysis, the measurement model of theoretical model's dimensions is reliable and valid.

Table 5.8: Outer Loadings for Theoretical Model's Dimensions (Mean, STDEV, T-Values, n = 200, Bootstrapping 500 samples)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen01 <- Decen	0.840	0.840	0.024	0.024	34.886
Decen02 <- Decen	0.745	0.743	0.035	0.035	21.273
Decen03 <- Decen	0.888	0.888	0.017	0.017	50.999
Decen04 <- Decen	0.839	0.838	0.022	0.022	38.192
Eu08 <- PEU	0.888	0.888	0.019	0.019	46.506
Eu09 <- PEU	0.780	0.779	0.034	0.034	22.657
Eu10 <- PEU	0.831	0.830	0.033	0.033	25.497
InterC <- Interdep	0.816	0.816	0.051	0.051	15.901
InterD <- Interdep	0.916	0.912	0.025	0.025	36.612
MP01 <- MP	0.815	0.813	0.028	0.028	29.068
MP02 <- MP	0.797	0.796	0.032	0.032	25.190
MP03 <- MP	0.812	0.812	0.027	0.027	29.581
MP04 <- MP	0.797	0.795	0.029	0.029	27.838
MP05 <- MP	0.795	0.792	0.033	0.033	23.766
MP08 <- MP	0.801	0.799	0.031	0.031	26.226
MasAgg10 <- Agg	0.777	0.774	0.029	0.029	26.441
MasAgg13 <- Agg	0.746	0.745	0.046	0.046	16.285
MasAgg15 <- Agg	0.855	0.853	0.027	0.027	32.228
MasInt18 <- Int	0.771	0.774	0.056	0.056	13.821
MasInt19 <- Int	0.911	0.907	0.022	0.022	41.100
MasScop01 <- Scop	0.932	0.932	0.009	0.009	98.477
MasScop02 <- Scop	0.872	0.868	0.030	0.030	29.135

Continue

Table 5.8: Outer Loadings for Theoretical Model's Dimensions (Mean, STDEV, T-Values, n = 200, Bootstrapping 500 samples) (Continued)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
MasScop01 <- Scop	0.932	0.932	0.009	0.009	98.477
MasScop02 <- Scop	0.872	0.868	0.030	0.030	29.135
MasTim06 <- Tim	0.809	0.810	0.027	0.027	29.824
MasTim07 <- Tim	0.815	0.814	0.028	0.028	29.484
MasTim08 <- Tim	0.742	0.740	0.045	0.045	16.674
MasTim09 <- Tim	0.761	0.756	0.058	0.058	13.029
TuTa09 <- Ta	0.868	0.867	0.034	0.034	25.566
TuTa10 <- Ta	0.831	0.827	0.045	0.045	18.297
TuTv02 <- Tv	0.872	0.873	0.030	0.030	29.348
TuTv05 <- Tv	0.925	0.924	0.023	0.023	40.330

Table 5.9: Inter-Construct Correlations, Average Variance Extracted (AVE), and Square root of AVE for Theoretical Model's Dimensions (n = 200)

	AVE	Composite Reliability	Agg	Decen	Int	Interdep	MP	PEU	Scop	TA	Tim	TV
Agg	0.63	0.84	**0.79**									
Decen	0.69	0.90	0.58	**0.83**								
Int	0.71	0.83	0.46	0.22	**0.84**							
Interdep	0.75	0.86	0.15	-0.06	0.39	**0.87**						
MP	0.64	0.92	0.29	0.23	0.25	-0.13	**0.80**					
PEU	0.70	0.87	-0.37	-0.21	-0.27	-0.16	-0.62	**0.84**				
Scop	0.81	0.90	0.00	0.11	-0.13	-0.26	0.40	-0.31	**0.90**			
TA	0.72	0.84	-0.34	-0.41	-0.17	-0.12	-0.35	0.49	-0.34	**0.85**		
Tim	0.61	0.86	0.60	0.42	-0.03	-0.16	0.40	-0.48	0.39	-0.24	**0.78**	
TV	0.81	0.89	0.02	-0.03	-0.20	-0.22	0.35	-0.12	0.31	-0.04	0.34	**0.90**

5.4.1.4 Assessing the Structural Model for Theoretical Model's Dimensions

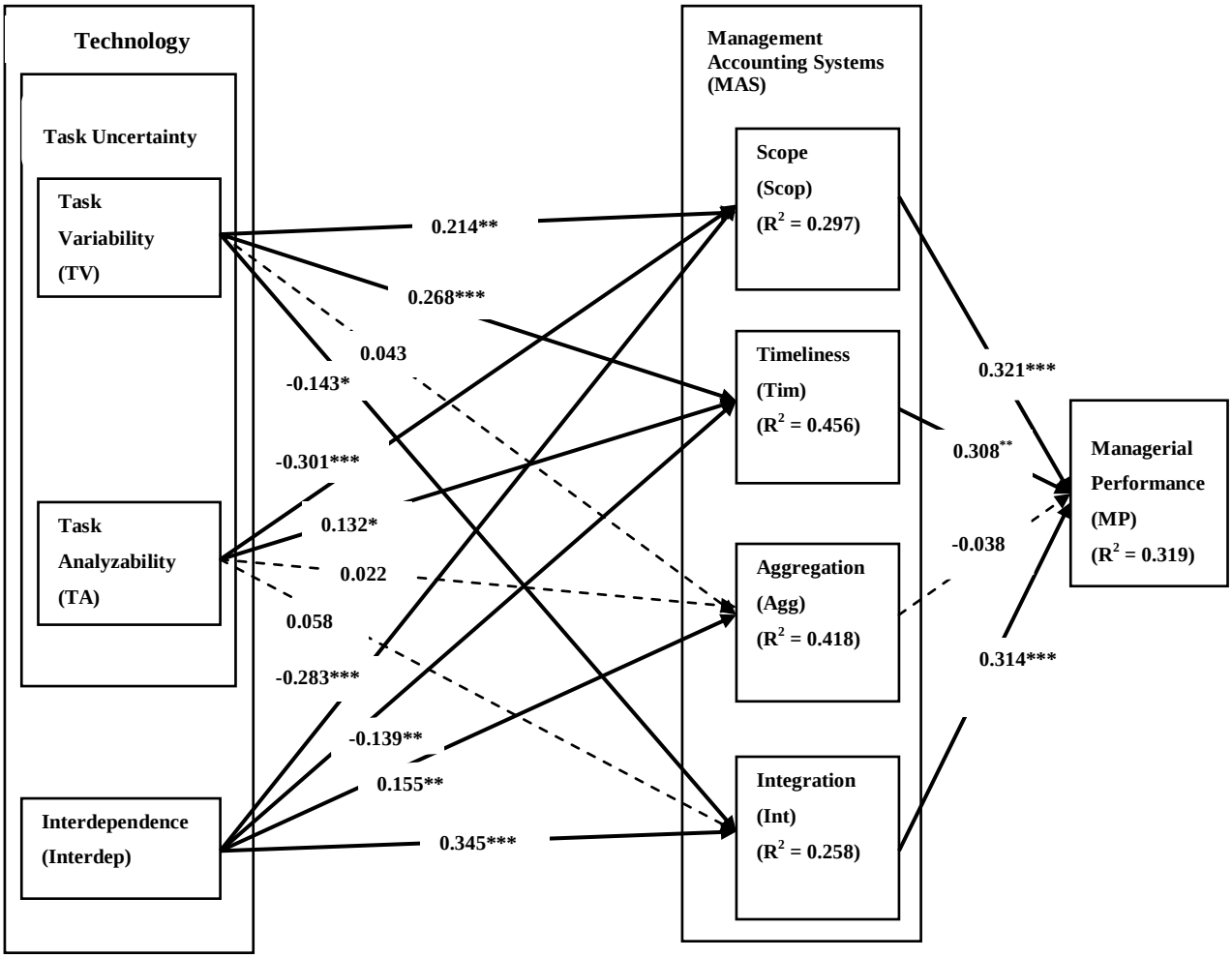

Figure 5.2: PLS Results for Theoretical Model's Dimensions

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

(Continued)

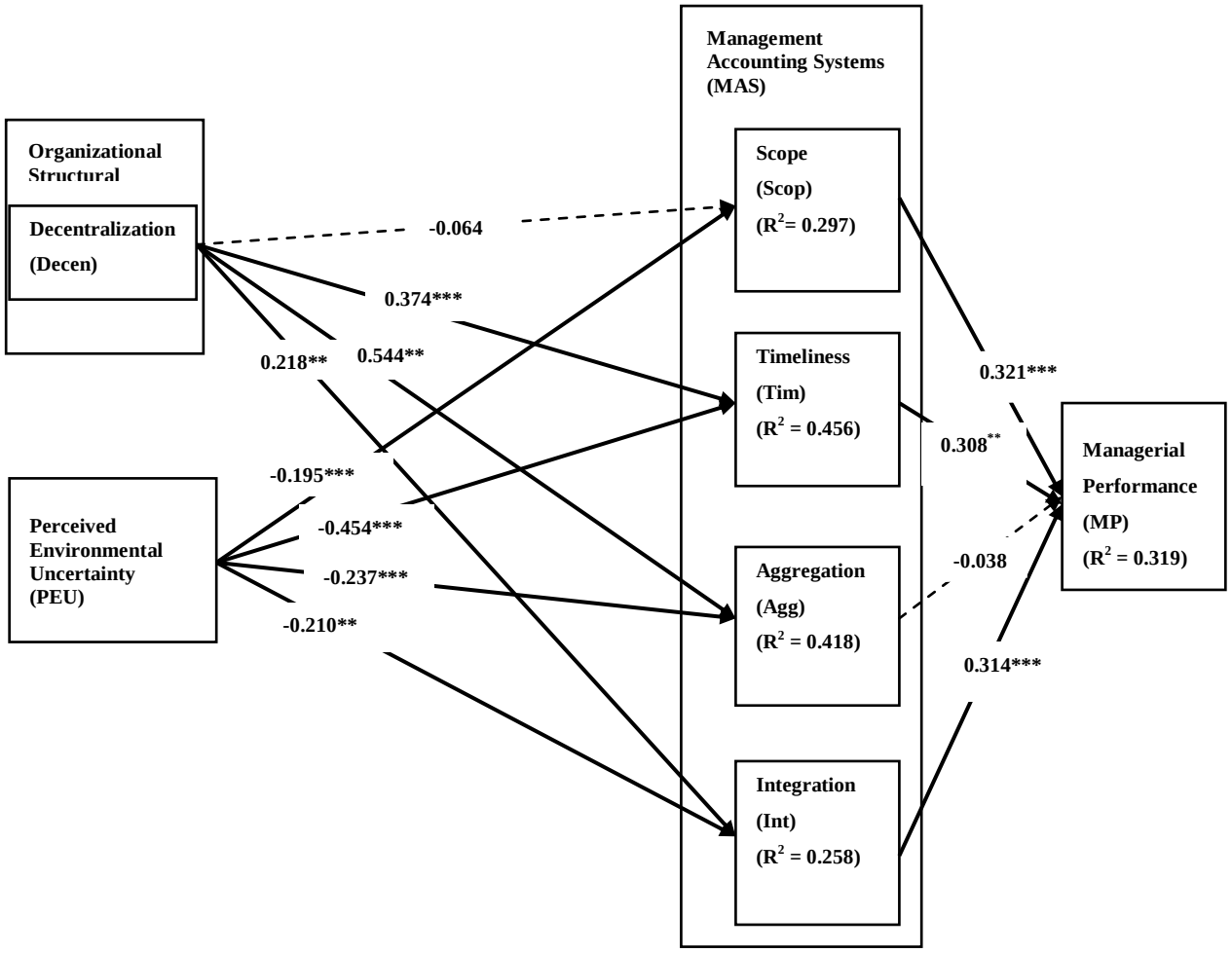

Figure 5.2: PLS Results for Theoretical Model's Dimensions (Continued)

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

Table 5.10: Path Coefficients (Mean, STDEV, T-Values, n = 200) for Theoretical Model's Dimensions

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Agg -> MP	-0.038	-0.040	0.112	0.112	0.343
Decen -> Agg	0.544	0.542	0.046	0.046	11.763
Decen -> Int	0.218	0.221	0.074	0.074	2.926
Decen -> Scop	-0.064	-0.068	0.067	0.067	0.949
Decen -> Tim	0.374	0.372	0.059	0.059	6.323
Int -> MP	0.314	0.317	0.055	0.055	5.672
Interdep -> Agg	0.155	0.153	0.059	0.059	2.605
Interdep -> Int	0.345	0.345	0.080	0.080	4.335
Interdep -> Scop	-0.283	-0.286	0.077	0.077	3.685
Interdep -> Tim	-0.139	-0.143	0.052	0.052	2.651
PEU -> Agg	-0.237	-0.238	0.064	0.064	3.696
PEU -> Int	-0.210	-0.207	0.072	0.072	2.913
PEU -> Scop	-0.195	-0.198	0.063	0.063	3.096
PEU -> Tim	-0.454	-0.457	0.067	0.067	6.804
Scop -> MP	0.321	0.328	0.066	0.066	4.845
Ta -> Agg	0.022	0.016	0.053	0.053	0.407
Ta -> Int	0.058	0.052	0.087	0.087	0.661
Ta -> Scop	-0.301	-0.303	0.078	0.078	3.852
Ta -> Tim	0.132	0.131	0.064	0.064	2.062
Tim -> MP	0.308	0.309	0.108	0.108	2.846
Tv -> Agg	0.043	0.041	0.063	0.063	0.693
Tv -> Int	-0.143	-0.142	0.070	0.070	2.030
Tv -> Scop	0.214	0.212	0.071	0.071	3.014
Tv -> Tim	0.268	0.269	0.057	0.057	4.736

As shown in Figure 5.2 and Table 5.10, task variability is significantly and positively associated with scope ($\beta = 0.214$, $p < 0.01$). This result indicates that the duties of clinical unit managers are moderately repetitious and they think that their work is routine.

Therefore, they are less likely to use broad scope information, which relates to possible future events and any quantification of the likelihood of future events occurring. In addition, there is a significant positive association between task variability and timeliness ($\beta = 0.268$, $p < 0.001$). This result shows that there is moderate routine in clinical unit managers' work. Consequently, they are less likely to use the information that arrives immediately upon request or supplied automatically upon its receipt into information systems or as soon as processing is completed. In addition, the delay between events occurs and relevant information being reported to them or providing reports infrequently has less effect on their work. Moreover, the relationship between task variability and integration is significant and negative ($\beta = -0.143$, $p < 0.05$). This result reveals that as the duties of clinical unit managers are moderately repetitious and their work is routine, they use more information on precise targets for the activities of all sections within their departments and information that relates to the impact of their decisions on the performance of their departments. Finally, the insignificant path between task variability and aggregation ($\beta = 0.043$, $p > 0.05$) indicates that due the moderate routine existing in clinical unit managers' work. The information provided on the different sections or functional areas in their hospital are less important. In addition, the information in formats suitable for input into decision models and information on the effect of different sections' activities on summary reports for their units and the overall hospital are also less important. Based on these results, the sub-hypothesis H1a is partially supported.

Task analysability is significantly and negatively associated with scope ($\beta = -0.301$, $p < 0.001$). This result indicates that clinical unit managers rely more on established procedures and practices to do their work and they have an understandable sequence of

steps that can be followed in carrying out the work in their departments (less task analysability). Therefore, they are less likely to use broad scope information, which relates to possible future events and any quantification of the likelihood of future events occurring. The significant positive path between task analysability and timeliness ($\beta = 0.132$, $p < 0.05$) indicates that due to the low difficulty that faces clinical unit managers in searching for solutions to problems that appear in their work. They are less likely to use the information that arrive immediately upon request or be supplied automatically upon its receipt into information systems or as soon as processing is completed. In addition, the insignificant path with aggregation ($\beta = 0.022$, $p > 0.05$) reveals that because of the moderate routine and the easy to find solutions for work problems, the use of aggregated MAS information is not important to clinical unit managers. Moreover, the relationship between task analysability and integration is insignificant ($\beta = 0.058$, $p > 0.05$). This result indicates that the use of integrated MAS information within managers' departments is less important. Accordingly, the above results do not support the sub-hypothesis H1b.

In addition, Figure 5.2 and Table 5.10 show that there is a negative significant relationship between interdependence and scope ($\beta = -0.283$, $p < 0.001$). This result indicates that despite there is a moderate reciprocal and sequential work flow between hospital departments, the clinical unit managers are less likely to use broad scope information, which relates to possible future events and any quantification of the likelihood of future events occurring. This result is surprising and is opposite to what was expected for using more broad scope MAS information to deal with these interdependencies. In addition, the significant negative relationship with timeliness ($\beta = -0.139$, $p < 0.01$) indicates that clinical unit managers with moderate interdependence are less likely to use timely MAS

information. As expected, there are significant and positive relationships between interdependence and aggregated ($\beta = 0.155$, $p < 0.01$) and integrated MAS information ($\beta = 0.345$, $p < 0.001$). These results indicate that due to the high interdependence between departments within hospitals, managers are more use for high aggregated information that provided for the different sections or functional areas in the hospital. In addition, managers are more use for information in formats suitable for input into decision models and information on the effect of different sections' activities on summary reports for their departments and the overall hospital. In addition, the managers are more use for integrated MAS information to coordinate between departments that have high interdependencies. Accordingly, the above results provide partial support for sub-hypothesis H1c.

Figure 5.2 and Table 5.10 show that decentralization is significantly and positively associated with timeliness ($\beta = 0.374$, $p < 0.001$). This result is surprising when compared with previous studies. This result reveals that clinical units under health care reform are treated as a business unit, and clinical unit managers are accountable for both costs and throughput targets (high decentralisation). Therefore, clinical unit managers are more use for information that arrives immediately upon request. In addition, they require no delay between the event occurring and relevant information reported to them frequently on a systematic and regular basis. In addition, the significant positive relationship with aggregation ($\beta = 0.544$, $p < 0.001$) indicates that clinical unit managers are more use for information that is provided on the different sections or functional areas in their hospital. In addition, they are more use for information in formats that is suitable for input into decision models and information on the effect of different sections' activities on summary reports for their departments and the overall hospital. Also, the significant positive

relationship between decentralisation and integration ($\beta = 0.218$, $p < 0.01$) reveals that the managers are more use for integrated MAS information to coordinate between their departments in the highly decentralized hospitals. However, the results show that there is an insignificant relationship with scope ($\beta = -0.064$, $p > 0.05$).This result reveals that despite clinical units are treated as a business unit, and that their managers are accountable for both costs and throughput targets (high decentralisation), the broad scope MAS information are less important for those managers. Based on these results the sub-hypothesis H2a is supported.

In addition, as expected, Figure 5.2 and Table 5.10 show that perceived environmental uncertainty is significantly negatively associated with scope ($\beta = -0.195$, $p < 0.01$), this result indicates that despite clinical unit managers often can determine the outcomes and the consequences of making decisions before they are made. Moreover, they can consider alternative courses of action before making a decision to follow a specific course of action (low PEU). They are more use for broad scope MAS information. In addition, the significant negative relationship with timeliness ($\beta = -0.454$, $p < 0.001$) reveals that clinical unit managers are more use for information that arrives immediately upon request frequently on a systematic and regular basis in low PEU situation. The results also show that there is a significant and negative relation between perceived environmental uncertainty and aggregation ($\beta = -0.237$, $p < 0.001$), which indicates that despite the low perceived environmental uncertainty facing clinical unit, the managers are more use for high aggregated information that is provided on the different functional areas in the hospital. In addition, they are more use for information concerning the effect of different sections' activities on their units and the overall hospital. Finally, the significant negative

relationship with integration ($\beta = -0.210$, $p < 0.01$) indicates that the managers are more use for integrated MAS information to coordinate between their departments with low perceived environmental uncertainty. Accordingly, the above results not provide support for the sub-hypothesis H3a.

In addition, as shown in Figure 5.2 and Table 5.10, three of the management accounting system dimensions are significantly positively associated with managerial performance, namely, scope ($\beta = 0.321$, $p < 0.001$), timeliness ($\beta = 0.308$, $p < 0.01$), and integration ($\beta = 0.314$, $p < 0.001$), however, aggregation has an insignificant path to managerial performance ($\beta = -0.038$, $p > 0.05$). These results indicate that clinical unit managers are more use for broad scope, timely, and integrated MAS information to enhance their managerial activities, namely, planning, investigating, coordinating, evaluating, supervising, and representing. In contrast, the aggregated information, which provided on the different functional areas and on the effect of different sections' activities on their units and the overall hospital in format suitable for input into decision models, is less important and it may hinder and make their performance dysfunctional. Consequently, these results support the sub-hypothesis H4a.

Figure 5.2 indicates 30 % of the variance in scope ($R^2 = 0.297$), 46 % of the variance in timeliness ($R^2 = 0.456$), 42 % of the variance in aggregation ($R^2 = 0.418$), 26 % of the variance in integration ($R^2 = 0.258$), and 32 % of the variance in managerial performance ($R^2 = 0.319$). In addition, as mentioned by Chin (1998a), 14 of the 24 standardized path coefficients are greater than 0.20 as a minimum value to be meaningful (the range of these paths was between -0.210 to 0.544). These 13 paths presented t-values ranging from 2.913

to 11.763 that all reached at least a 0.05 significant level (see Table 5.10). Moreover, all significant constructs display strong positive loadings and high levels of statistical significance for all items (see Tables 5.8 and 5.9).

5.4.2 Hypothesis 5, 6, and 7: The Mediating Effect of MAS Information on the Relationships between Contextual Variables and Managerial Performance

Contingency fit in management accounting systems (MAS) research is often analysed by using the form of mediation (Gerdin & Greve, 2004; Luft & Shields, 2003; Venkatraman, 1989). The mediation form refers to the effect of the independent variable through the mediating variable on the dependent variable and whether it operates completely or partially. Although many contingency-type studies in the management accounting systems literature (e.g., Baines & Langfield-Smith, 2003; Chong & Chong, 1997) used path analytical techniques, Gerdin and Greve (2008) stated that even though these methods contribute to our understanding about what determines the design and use of management accounting systems, they do not test for the existence of the interaction effects between the context and management accounting systems on performance.

Following Chin (1998a, 1998b, 2001), PLS was used to estimate the research model (Figures 4.1). Wold (1982) developed PLS as a second generation structural equation modelling (SEM) technique that works well with models that contain latent variables and a series of "cause and effect" relationships (Bontis, Booker, & Serenko, 2007, p. 1433). In addition, Chin (1998a) stated that PLS provides more precise estimates of interaction effects (such as mediation) because it reports measurement error.

Furthermore, PLS is an appropriate technique to test mediation effects because mediation effects are the product of two relationships; independent variable to mediator, and mediator to dependent variable (Bontis et al., 2007). Since the product of two variables that have normal distribution is always skewed (Bollen & Stine, 1990; Lockwood & Mackinnon, 1998) PLS works well with non-normal data because it does not depend on normality assumptions and it tests the significance of relationships using bootstrapping (Efron, 1988).

Moreover, for testing mediation, three general approaches were suggested (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The first approach is the causal steps approach suggested by Baron and Kenny (1986), and Judd and Kenny (1981). The second approach, which examines regression coefficients before and after adding the intervening variable, is the difference in coefficients approach. Finally, the product of coefficients involving paths in a path model approach represents the third approach (Bontis et al., 2007). In this study, the third approach was used to determine significant paths in the direct relationships between independent variables (technology, organizational structure, perceived environmental uncertainty), and dependent variables (managerial performance). After that, these paths will be compared with the same significant paths after adding management accounting systems information as a mediator to determine whether management accounting systems information has a mediating effect or not.

5.4.2.1 Assessing Measurement Model for Direct Relationships

As shown in Appendix C 7, many items exceed the 0.70 loading level, which indicates that these items share more variance with their respective constructs than with error variance.

Those items with loadings less than 0.70 were deleted.

The Cronbach's alphas are shown in Table 5.11. Consistent with the academic literature, the reliability of the constructs exceeded 0.70 in all. In addition, the constructs' composite reliability exceed the 0.70 level suggested by Nunnally (1978) and , as shown in Table 5.11, they range from 0.86 to 1.00.

Table 5.11: Reliability Assessment for Direct Relationships (Cronbach's Alphas and Composite Reliability Index, n = 200)

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Managerial Performance (MP)	0.64	0.92	0.43	0.89
Organizational Structure (OrgStruc)	0.62	0.86		0.85
Perceived Environmental Uncertainty (PEU)	0.70	0.87		0.78
Technology (Tech)	1.00	1.00		1.00

Table 5.11 explains that there is adequate convergent validity because the average variance extracted (AVE) for all constructs exceeds 0.50. In addition, as shown in Table 5.12, the t-values in all the convergent validity assessments are much greater than 1.96 indicating high convergent validity.

As shown in Table 5.13, the correlation matrix explains in the off-diagonal the correlation among constructs and, in the diagonal, the square root of AVE. Since all diagonal elements in the correlation matrix are greater than their respective off-diagonal elements, these are considered to demonstrate sufficient discriminant validity. Therefore, based on the above analysis, the measurement model of theoretical model's direct relationships is reliable and valid.

Table 5.12: Outer Loadings for Direct Relationships (Mean, STDEV, T-Values, n = 200, Bootstrapping 500 samples)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen01 <- OrgStruc	0.706	0.674	0.121	0.121	5.831
Decen02 <- OrgStruc	0.907	0.903	0.031	0.031	29.294
Decen03 <- OrgStruc	0.849	0.828	0.075	0.075	11.303
Decen04 <- OrgStruc	0.659	0.622	0.123	0.123	5.346
Eu08 <- PEU	0.905	0.905	0.014	0.014	64.870
Eu09 <- PEU	0.767	0.764	0.038	0.038	20.091
Eu10 <- PEU	0.826	0.827	0.032	0.032	26.096
MP01 <- MP	0.819	0.817	0.027	0.027	30.833
MP02 <- MP	0.810	0.808	0.028	0.028	28.457
MP03 <- MP	0.806	0.806	0.028	0.028	29.247
MP04 <- MP	0.778	0.779	0.033	0.033	23.568
MP05 <- MP	0.788	0.787	0.034	0.034	23.339
MP08 <- MP	0.817	0.815	0.026	0.026	31.845
TuTa09 <- Tech	1.000	1.000	0.000		

Table 5.13: Inter-Construct Correlations, Average Variance Extracted (AVE), and Square root of AVE for Direct Relationships (n = 200)

	AVE	Composite Reliability	MP	OrgStruc	PEU	Tech
MP	0.64	0.92	**0.80**			
OrgStruc	0.62	0.86	0.37	**0.79**		
PEU	0.70	0.87	-0.62	-0.31	**0.84**	
Tech	1.00	1.00	-0.37	-0.44	0.37	**1.00**

5.4.2.2 Assessing Structural Model for Direct Relationships

As shown in Figure 5.3 and Table 5.14, there is insignificant relationship between technology and managerial performance (β = -0.098, p > 0.05). In addition, there is a significant and positive relationship between organizational structure and managerial performance (β = 0.164, p < 0.01). Finally, the relationship between perceived environmental uncertainty and managerial performance is significantly negative (β = -0.535, p < 0.001).

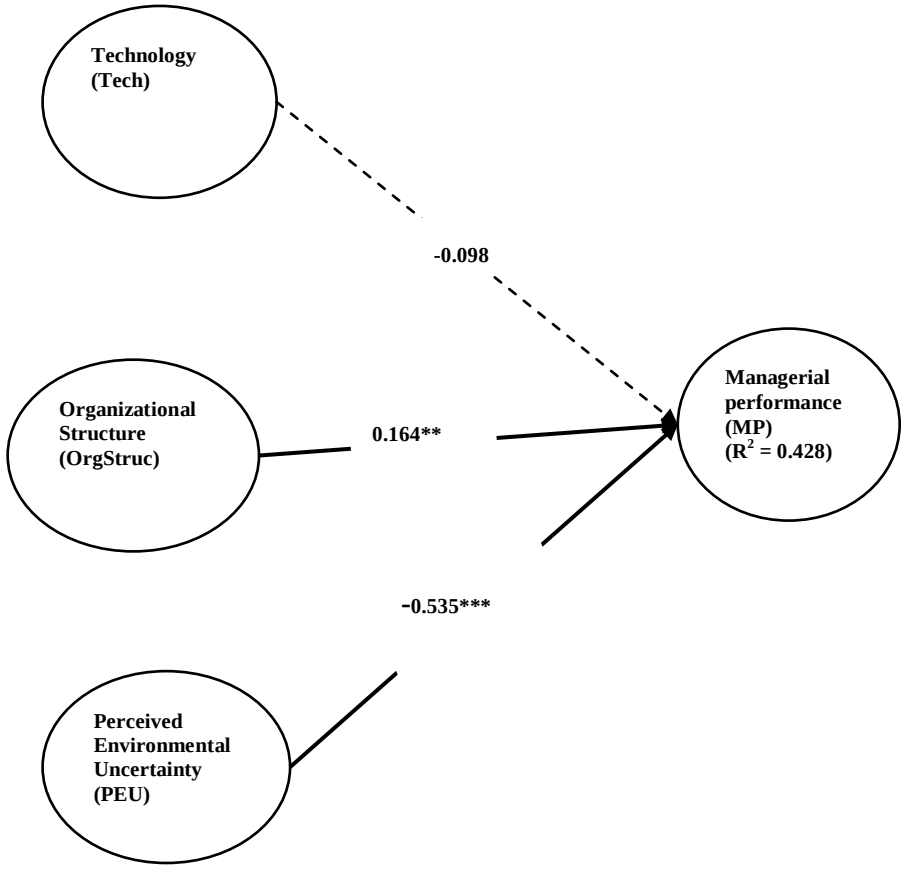

Figure 5.3: PLS Results for Direct Relationships

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

Table 5.14: Path Coefficients (Mean, STDEV, T-Values, n = 200) for Direct Relationships

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
OrgStruc -> MP	0.164	0.178	0.051	0.051	3.210
PEU -> MP	-0.535	-0.533	0.055	0.055	9.716
Tech -> MP	-0.098	-0.094	0.062	0.062	1.570

Figure 5.3 indicates 43 % of the variance in managerial performance (R^2 = 0.428). In addition, as mentioned by Chin (1998a), one of the 3 standardized path coefficients is greater than 0.20 as a minimum value to be meaningful. This path presented t-values reached at least a 0.05 significant level (see Table 5.14). Moreover, all significant constructs display strong positive loadings and high levels of statistical significance for all items (see Tables 5.12 and 5.13).

5.4.2.3 Assessing Measurement Model for Dimensions' Direct Relationships

As shown in Appendix C 10, many items exceed the 0.70 loading level, which shows that these items share more variance with their respective constructs than with error variance. Those items with loadings less than 0.70 were deleted.

Internal consistency was first assessed by examining the Cronbach's alphas, which are influenced by the loadings of the items; the Cronbach's alphas are shown in Table 5.15. Consistent with the academic literature, the reliability of the constructs exceeded 0.70 in all (except Interdep = 0.50). In addition, as shown in Table 5.15, the constructs' composite

reliability exceed the 0.70 level suggested by Nunnally (1978), and as shown in Table 5.15, they range from 0.75 to 0.92.

Table 5.15: Reliability Assessment for Dimensions' Direct Paths (Cronbach's Alphas and Composite Reliability Index, n = 200)

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Decen	0.62	0.86		0.85
Interdep	0.62	0.75		0.50
MP	0.64	0.92	0.55	0.89
PEU	0.70	0.87		0.78
TA	0.61	0.82		0.71
TV	0.69	0.87		0.77

Table 5.15 show that there are adequate convergent validity, because the average variance extracted (AVE) for all constructs exceeds 0.50. Table 5.16 shows the outer model loadings for the recommended model. The t-values in all the convergent validity assessments are much greater than 1.96 (except Inter A—Interdep) indicating high convergent validity.

As shown in Table 5.17, the correlation matrix explains, in the off-diagonal, the correlation among constructs and, in the diagonal, the square root of average variance extracted (AVE). Since all diagonal elements in the correlation matrix are greater than their respective off-diagonal elements, these are considered to demonstrate sufficient discriminant validity. As a result, based on the above analysis, the measurement model of dimensions' direct relationships is reliable and valid.

Table 5.16: Outer Loadings for Dimensions' Direct Paths (Mean, STDEV, T-Values, n = 200, Bootstrapping 500 Samples)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen01 <- Decen	0.705	0.668	0.132	0.132	5.354
Decen02 <- Decen	0.907	0.904	0.034	0.034	26.863
Decen03 <- Decen	0.849	0.826	0.083	0.083	10.282
Decen04 <- Decen	0.658	0.626	0.134	0.134	4.893
Eu08 <- PEU	0.905	0.905	0.014	0.014	63.730
Eu09 <- PEU	0.767	0.766	0.039	0.039	19.538
Eu10 <- PEU	0.826	0.824	0.033	0.033	25.207
InterA <- Interdep	0.542	0.487	0.299	0.299	1.812
InterD <- Interdep	0.974	0.935	0.089	0.089	10.944
MP01 <- MP	0.820	0.820	0.026	0.026	31.810
MP02 <- MP	0.813	0.813	0.027	0.027	30.271
MP03 <- MP	0.807	0.808	0.025	0.025	32.893
MP04 <- MP	0.779	0.779	0.033	0.033	23.619
MP05 <- MP	0.787	0.786	0.037	0.037	21.473
MP08 <- MP	0.813	0.813	0.025	0.025	32.400
TuTa06 <- Ta	0.690	0.668	0.100	0.100	6.901
TuTa09 <- Ta	0.862	0.869	0.039	0.039	22.055
TuTa10 <- Ta	0.787	0.769	0.063	0.063	12.565
TuTv02 <- Tv	0.793	0.793	0.044	0.044	18.024
TuTv03 <- Tv	0.784	0.778	0.056	0.056	13.989
TuTv05 <- Tv	0.905	0.905	0.018	0.018	51.736

Table 5.17: Inter-Construct Correlations, Average Variance Extracted (AVE), and Square Root of AVE for Dimensions' Direct Paths (n = 200)

	AVE	Composite Reliability	Decen	Interdep	MP	PEU	TA	TV
Decen	0.62	0.86	**0.79**					
Interdep	0.62	0.75	-0.07	**0.79**				
MP	0.64	0.92	0.37	-0.15	**0.80**			
PEU	0.70	0.87	-0.31	-0.12	-0.62	**0.84**		
TA	0.61	0.82	-0.47	-0.10	-0.35	0.46	**0.78**	
TV	0.69	0.87	-0.06	-0.17	0.37	-0.11	0.09	**0.83**

5.4.2.4 Assessing Structural Model for Dimensions' Direct Relationships

As shown in Figure 5.4, task variability is significantly positively associated with managerial performance ($\beta = 0.307$, $p < 0.001$). In addition, task analysability has an insignificant path to managerial performance ($\beta = -0.068$, $p > 0.05$). There is a significant negative relationship between interdependence and managerial performance ($\beta = -0.156$, $p < 0.01$), but decentralization is significantly positively associated with managerial performance ($\beta = 0.189$, $p < 0.001$). In addition, perceived environmental uncertainty is significantly negatively associated with managerial performance ($\beta = -0.516$, $p < 0.001$). Figure 5.4 indicates that there is 55 % of the variance in managerial performance ($R^2 = 0.551$).

In addition, as mentioned by Chin (1998a), 2 of the 5 standardized path coefficients are greater than 0.20 as a minimum value to be meaningful (the range of these paths was between 0.307 to -0.516). These two paths presented t-values ranging from 6.624 to 8.995 that all reached at least a 0.05 significant level (see Table 5.18). Moreover, all significant constructs displayed strong positive loadings and high levels of statistical significance for

all items (see Tables 5.16 and 5.17).

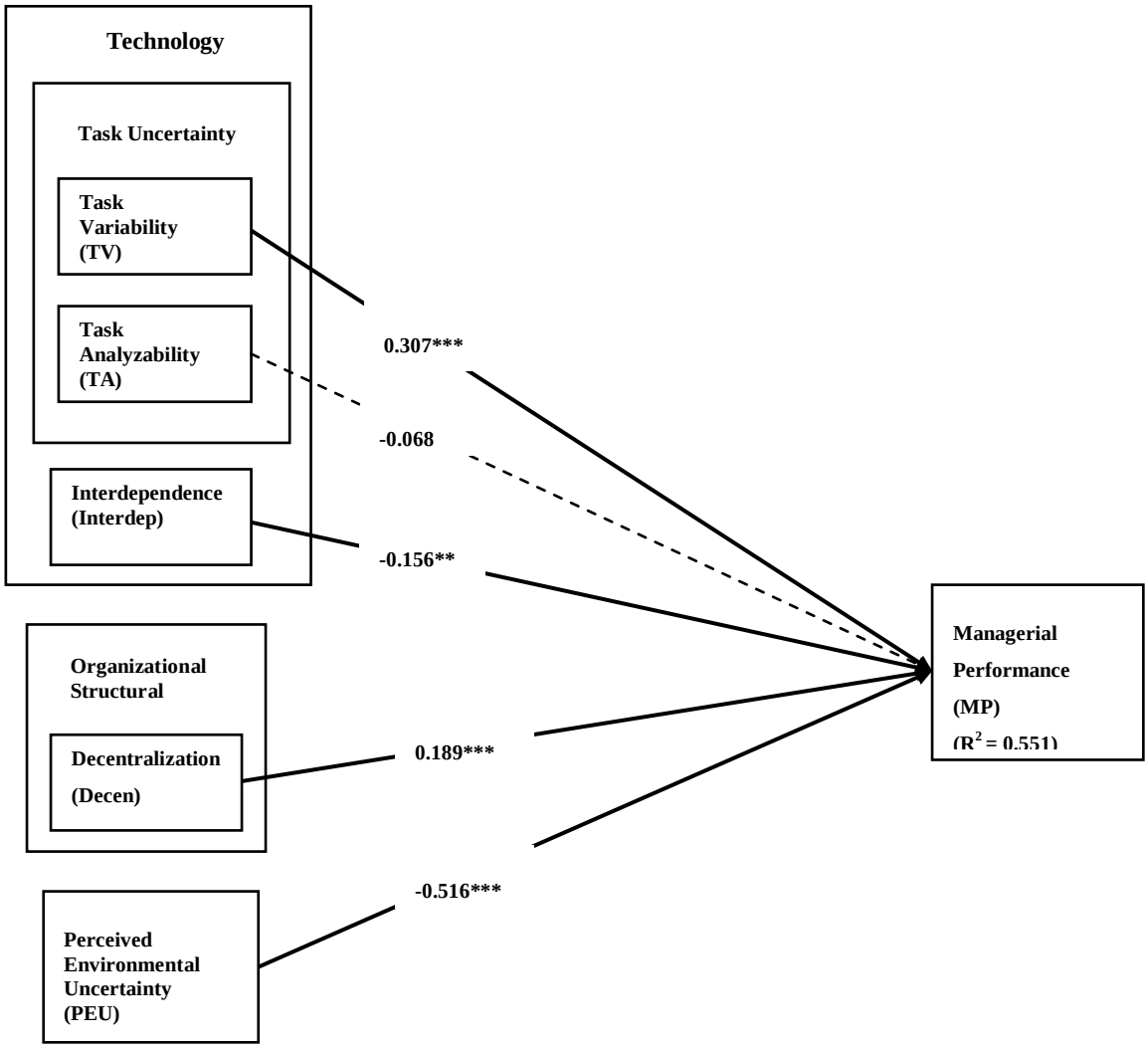

Figure 5.4: PLS Results for Dimensions' Direct Relationships

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

Table 5.18: Path Coefficients (Mean, STDEV, T-Values, n = 200) for Dimensions' Direct Paths

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen -> MP	0.189	0.193	0.045	0.045	4.162
Interdep -> MP	-0.156	-0.157	0.054	0.054	2.884
PEU -> MP	-0.516	-0.509	0.057	0.057	8.995
Ta -> MP	-0.068	-0.072	0.067	0.067	1.016
Tv -> MP	0.307	0.311	0.046	0.046	6.624

5.4.2.5 Measuring the Direct and Indirect Effect of Technology, Organizational Structure, and PEU on Managerial Performance via MAS Information

As shown in Figure 5.1, Figure 5.3, and Table 5.19 (overall theoretical model);

i. Technology does not has an indirect effect on managerial performance via MAS ($\beta = -0.017$, $p > 0.05$; $\beta = 0.387$, $p < 0.001$), also, it has an insignificant direct effect ($\beta = -0.098$, $p > 0.05$) on managerial performance.

Consequently, management accounting systems information does not mediate the relationship between technology and managerial performance; therefore, the main hypothesis H5 is not supported.

ii. Organizational structure has an indirect effect on managerial performance via management accounting systems information ($\beta = 0.383$ $p < 0.001$; $\beta = 0.387$, $p < 0.001$).

Indirect effect = 0.383 * 0.387 = 0.148

This indicates that organizational structure has an indirect effect of 15 percent on

managerial performance via management accounting systems information. These indirect effects are less than the direct effect of organizational structure on managerial performance ($\beta = 0.164$ $p < 0.01$). Consequently, management accounting systems information does not mediate the relationship between organizational structure and managerial performance; therefore, the main hypothesis H6 is not supported.

Table 5.19: Path Coefficients of Indirect and Direct Models with t- statistics (n = 200)

	β	t-value
Indirect Model		
MAS -> MP	0.387	8.162***
OrgStruc -> MAS	0.383	6.585***
PEU -> MAS	-0.352	5.433***
Tech -> MAS	-0.017	0.281
Direct Model		
OrgStruc -> MP	0.164	3.210**
PEU -> MP	-0.535	9.716***
Tech -> MP	-0.098	1.570

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

iii. Perceived environmental uncertainty has an indirect effect on managerial performance via management accounting systems information ($\beta = -0.352$ $p < 0.001$; $\beta = 0.387$, $p < 0.001$).

Indirect effect = -0.352 * 0.387 = -0.136

This indicates that perceived environmental uncertainty has an indirect effect of 14 percent on managerial performance via management accounting systems information. These indirect effects are less than the direct effect of perceived environmental uncertainty on managerial performance ($\beta = -0.535$ $p < 0.001$). Consequently, management accounting systems information does not mediate the relationship between perceived environmental uncertainty and managerial performance; therefore, the main hypothesis H7 is not supported.

As shown in Figure 5.2, Figure 5.4, and Table 5.20 (theoretical model's dimensions);

i. Task variability has an indirect effect on managerial performance via the paths:

a. Scope ($\beta = 0.214$, $p < 0.01$; $\beta = 0.321$, $p < 0.001$)

Indirect effect = 0.214* 0.321= 0.069

b. Timeliness ($\beta = 0.268$, $p < 0.001$; $\beta = 0.308$, $p < 0.01$)

Indirect effect = 0.268 * 0.308= 0.083

c. Integration ($\beta = -0.143$, $p < 0.05$; $\beta = 0.314$, $p < 0.001$)

Indirect effect = 0.143 * 0.314 = 0.045

This indicates that task variability has an indirect effect of 6.9, 8.3, and 4.5 percent on managerial performance via MAS scope, timeliness, and integration, respectively. These indirect effects are less than the direct effect of task variability on managerial performance ($\beta = 0.307$, $p < 0.001$). Consequently, management accounting systems that provide broad, timely, aggregated, and integrated information do not mediate the relationship between task variability and managerial performance; therefore, the sub-hypothesis H5a is not supported.

ii. Although task analysability has an indirect effect on managerial performance via scope MAS ($\beta = -0.301$, $p < 0.001$; $\beta = 0.321$, $p < 0.001$), and timeliness ($\beta = 0.132$, $p < 0.05$; $\beta = 0.308$, $p < 0.01$), task analysability has an insignificant direct effect ($\beta = -0.068$, $p > 0.05$) on managerial performance.

Consequently, management accounting systems that provide broad, timely, aggregated, and integrated information do not mediate the relationship between task analysability and managerial performance; therefore, the sub-hypothesis H5b is not supported.

Table 5.20: Path Coefficients of Indirect and Direct Models with t- statistics (Theroretical Models' Dimensions, n = 200)

	β	t-value
Indirect Model		
Agg -> MP	-0.038	0.343
Decen -> Agg	0.544	11.763***
Decen -> Int	0.218	2.926**
Decen -> Scop	-0.064	0.949
Decen -> Tim	0.374	6.323***
Int -> MP	0.314	5.672***
Interdep -> Agg	0.155	2.605**
Interdep -> Int	0.345	4.335***
Interdep -> Scop	-0.283	3.685***
Interdep -> Tim	-0.139	2.651**
PEU -> Agg	-0.237	3.696***
PEU -> Int	-0.210	2.913**
PEU -> Scop	-0.195	3.096**
PEU -> Tim	-0.454	6.804***
Scop -> MP	0.321	4.845***
Ta -> Agg	0.022	0.407
Ta -> Int	0.058	0.661
Ta -> Scop	-0.301	3.852***
Ta -> Tim	0.132	2.062*
Tim -> MP	0.308	2.846**
Tv -> Agg	0.043	0.693
Tv -> Int	-0.143	2.030*
Tv -> Scop	0.214	3.014**
Tv -> Tim	0.268	4.736***
Direct Model		
Decen -> MP	0.189	4.162***
Interdep -> MP	-0.156	2.884**
PEU -> MP	-0.516	8.995***
Ta -> MP	-0.068	1.016
Tv -> MP	0.307	6.624***

* P < 0.05 level (n = 200, t critical value =1.960); ** p < 0.01 level (n = 200, t critical value = 2.576); *** p < 0.001 level (n = 200, t critical value = 3.291)

iii. Interdependence has an indirect effect on managerial performance via the paths:

a. Scope (β = -0.283, p < 0.001; β = 0.321, p < 0.001)

Indirect effect = -0.283 * 0.321= -0.091

b. Timeliness (β = -0.139, p < 0.01; β = 0.308, p < 0.01)

Indirect effect = -0.139 * 0.308 = -0.043

c. Integration ($\beta = 0.345$, $p < 0.001$; $\beta = 0.314$, $p < 0.001$)

Indirect effect = 0.345 * 0.314= 0.108

This indicates that interdependence has an indirect effect of 9.1, 4.3, and 10.8 percent on managerial performance via MAS scope, timeliness, and integration, respectively. These indirect effects are less than the direct effect of interdependence on managerial performance ($\beta = -0.156$, $p < 0.01$). Consequently, management accounting systems that provide broad, timely, aggregated, and integrated information do not mediate the relationship between interdependence and managerial performance; therefore, the sub-hypothesis H5c is not supported.

iv. Decentralization has an indirect effect on managerial performance via the paths:

a. Timeliness ($\beta = 0.374$, $p < 0.001$; $\beta = 0.308$, $p < 0.01$)

Indirect effect = 0.374 * 0.308 = 0.115

b. Integration ($\beta = 0.218$, $p < 0.01$; $\beta = 0.314$, $p < 0.001$)

Indirect effect = 0.218* 0.314= 0.068

This indicates that decentralization has an indirect effect of 11.5 and 6.8 percent on managerial performance via MAS timeliness, and integration, respectively. These indirect effects are less than the direct effect of decentralization on managerial performance ($\beta = 0.189$, $p < 0.001$). Consequently, management accounting systems that provide broad, timely, aggregated, and integrated information do not mediate the relationship between decentralization and managerial performance; therefore, the sub-hypothesis H6a is not supported.

v. Perceived environmental uncertainty has an indirect effect on managerial performance via the paths:

   a. Scope ($\beta = -0.195$, $p < 0.01$; $\beta = 0.321$, $p < 0.001$)

      Indirect effect = -0.195 * 0.321 = -0.063

   b. Timeliness ($\beta = -0.454$, $p < 0.001$; $\beta = 0.308$, $p < 0.01$)

      Indirect effect = -0.454 * 0.308 = -0.140

   c. Integration ($\beta = -0.210$, $p < 0.01$; $\beta = 0.314$, $p < 0.001$)

      Indirect effect = -0.210 * 0.314 = -0.066

This indicates that perceived environmental uncertainty has an indirect effect of 6.3, 14, and 6.6 percent on managerial performance via MAS scope, timeliness, and integration, respectively. These indirect effects are less than the direct effect of perceived environmental uncertainty on managerial performance ($\beta = -0.516$, $p < 0.001$). Consequently, management accounting systems that provide broad, timely, aggregated, and integrated information do not mediate the relationship between perceived environmental uncertainty and managerial performance; therefore, the sub-hypothesis H7a is not supported.

5.4.3 Hypothesis 8: Effect of Hospital Size on the Relationship between Contextual Variables, MAS Information, and Managerial Performance

To examine the effect of hospital size on the relationship between contextual variables (technology, organizational structure, perceived environmental uncertainty), management accounting systems information, and managerial performance, the original sample (n = 200) was divided into two groups based on hospital size (according to "*Central Agency for public Mobilization and Statistics* *www.capmas.gov.eg*"), which were measured by the

number of beds. The first group is small hospitals that have less than 200 beds (n = 89), while the second group is large hospitals that have more than 200 beds (n = 111). As a result, the same PLS path model is estimated for each of the distinct sub samples (small and large hospitals) to assess their measurement and structural model and compare the path coefficients between two groups at a time. This allows an interpretation of the differences in effect between groups. In addition, differences between the paths estimators were tested for significance with a t-test as discussed below.

5.4.3.1 Small Hospitals

5.4.3.1.1 Assessing Measurement Model for Small Hospitals

As shown in Appendix C 13, many items exceed the 0.70 loading level, which indicates that these items share more variance with their respective constructs than with error variance. Those items with loadings less than 0.70 were deleted. Internal consistency was first assessed by examining Cronbach's alphas, which is influenced by the loadings of the items. The Cronbach's alphas are shown in Table 5.21. Consistent with the academic literature, the reliability of the constructs exceeded 0.70 in all (except Tech = 0.68).

Table 5.21: Reliability Assessment for Theoretical Model (Cronbach's Alphas and Composite Reliability Index, Small Hospitals, n = 89)

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Management Accounting Systems (MAS)	0.72	0.88	0.50	0.80
Managerial Performance (MP)	0.60	0.90	0.49	0.87
Organizational Structure (OrgStruc)	0.66	0.88		0.83
Perceived environmental uncertainty (PEU)	1.00	1.00		1.00
Technology (Tech)	0.76	0.86		0.68

Table 5.22: Outer Loadings for Theoretical Model (Mean, STDEV, T-Values, Small Hospitals, n = 89, Bootstrapping 500 Samples)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen01 <- OrgStruc	0.809	0.811	0.032	0.032	24.957
Decen02 <- OrgStruc	0.716	0.718	0.065	0.065	11.088
Decen03 <- OrgStruc	0.887	0.885	0.028	0.028	31.595
Decen04 <- OrgStruc	0.826	0.824	0.045	0.045	18.285
Eu08 <- PEU	1.000	1.000	0.000		
MP01 <- MP	0.792	0.790	0.039	0.039	20.069
MP02 <- MP	0.758	0.756	0.055	0.055	13.705
MP03 <- MP	0.770	0.764	0.049	0.049	15.763
MP04 <- MP	0.760	0.760	0.042	0.042	18.164
MP05 <- MP	0.743	0.730	0.063	0.063	11.849
MP08 <- MP	0.824	0.824	0.038	0.038	21.864
MasAgg10 <- MAS	0.859	0.860	0.024	0.024	35.303
MasTim06 <- MAS	0.847	0.846	0.034	0.034	24.957
MasTim07 <- MAS	0.838	0.834	0.044	0.044	18.843
TuTa08 <- Tech	0.882	0.881	0.038	0.038	23.348
TuTa09 <- Tech	0.857	0.853	0.058	0.058	14.840

In addition, the constructs' composite reliability exceed the 0.70 level suggested by Nunnally (1978) and, as shown in Table 5.21, they range from 0.86 to 1.00. Table 5.21 explained that there is adequate convergent validity because the average variance extracted (AVE) for all constructs exceeds 0.50. In addition, Table 5.22 shows the outer model

loadings for the recommendation model. The t-values in all the convergent validity assessments are much greater than 1.96 indicating high convergent validity. As shown in Table 5.23, the correlation matrix explains, in the off-diagonal, the correlation among constructs and, in the diagonal, the square root of average variance extracted (AVE).

Table 5.23: Inter-Construct Correlations, Average Variance Extracted (AVE), and Square Root of AVE for Theoretical Model (Small Hospitals, n = 89)

	AVE	Composite Reliability	MAS	MP	OrgStruc	PEU	Tech
MAS	0.72	0.88	**0.85**				
MP	0.60	0.90	0.70	**0.77**			
OrgStruc	0.66	0.88	0.56	0.44	**0.81**		
PEU	1.00	1.00	-0.59	-0.61	-0.33	**1.00**	
Tech	0.76	0.86	-0.43	-0.36	-0.66	0.31	**0.87**

Since all diagonal elements in the correlation matrix are greater than their respective off-diagonal elements, these are considered to demonstrate sufficient discriminant validity. As a result, based on the above analysis, the measurement model of theoretical model is reliable and valid.

5.4.3.1.2 Assessing Structural Model for Small Hospitals

As shown in Figure 5.5 and Table 5.24, technology has insignificant relationship with management accounting systems information (β = -0.034, $p > 0.05$), and there are significant and positive relationship between organizational structure and management accounting systems information (β = 0.395, $p < 0.001$), but there significant negative relationship between perceived environmental uncertainty and management accounting systems information (β = -0.447, $p < 0.001$). Finally, management accounting systems

information has significant positive relationship with managerial performance (β = 0.702, p < 0.001).

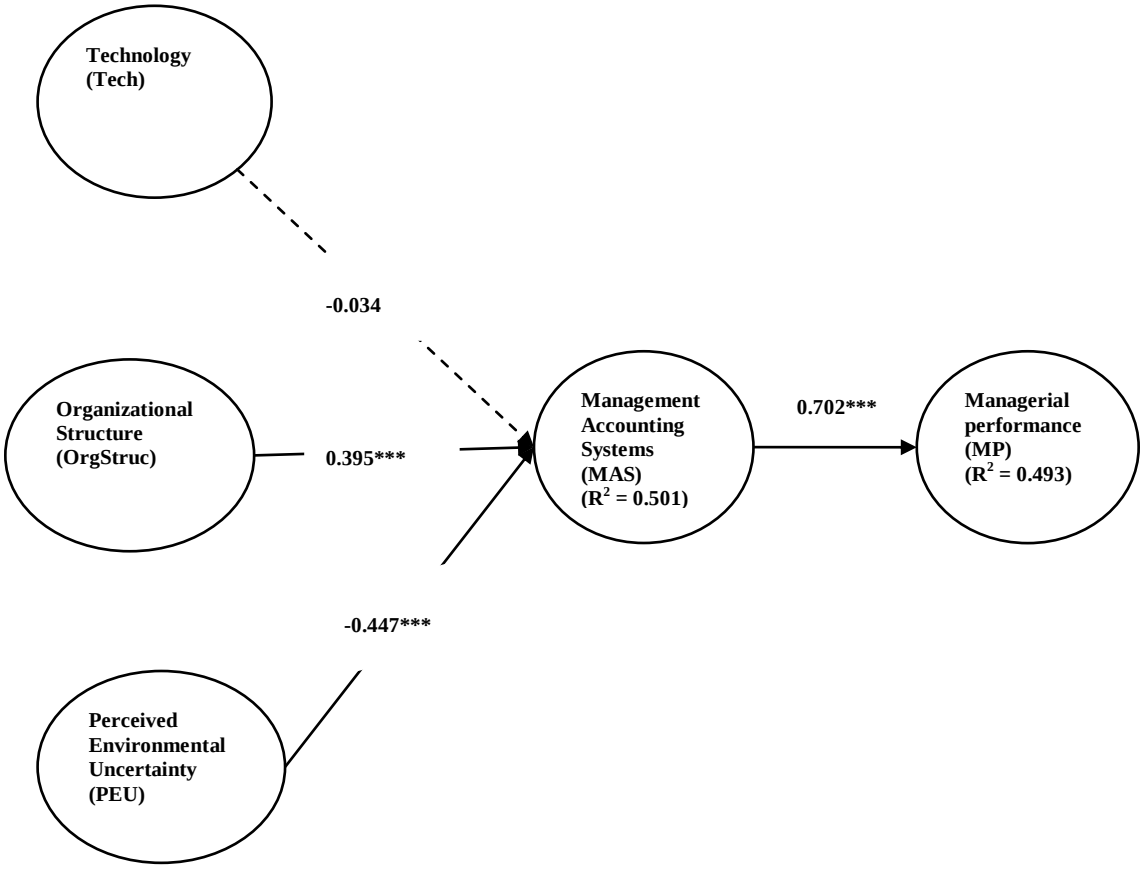

Figure 5.5: PLS Results for Theoretical Model (Small Hospitals)

* P < 0.05 level (n = 89, t critical value =1.960); ** p < 0.01 level (n = 89, t critical value = 2.576); *** p < 0.001 level (n = 89, t critical value = 3.291)

Table 5.24: Path Coefficients for Theoretical Model (Mean, STDEV, T-Values, Small Hospitals, n = 89)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
MAS -> MP	0.702	0.711	0.042	0.042	16.646
OrgStruc -> MAS	0.395	0.386	0.113	0.113	3.492
PEU -> MAS	-0.447	-0.448	0.087	0.087	5.134
Tech -> MAS	-0.034	-0.043	0.108	0.108	0.316

Figure 5.5 explains 50 % of the variance in management accounting systems information (R^2 = 0.501), and 49 % of the variance in managerial performance (R^2 = 0.493). In addition, in accordance with Chin (1998a), 3 of the 4 standardized path coefficients are greater than 0.20 as a minimum value to be meaningful (the range of these paths was between 0.395 to 0.702). These 3 paths presented t-values ranging from 3.492 to 16.646 that all reached at least a 0.05 significant level (see Table 5.24). Moreover, all significant constructs display strong positive loadings and high levels of statistical significance for all items (see Tables 5.22 and 5.23).

5.4.3.2 Large Hospitals

5.4.3.2.1 Assessing Measurement Model for Large Hospitals

As shown in Appendix C 16, many items exceed the 0.70 loading level, which shows that these items share more variance with their respective constructs than with error variance. Those items with loadings less than 0.70 were deleted.

Internal consistency was first assessed by examining Cronbach's alphas, which is influenced by the loadings of the items. The Cronbach's alphas are shown in Table 5.25. Consistent with the academic literature, the reliability of the constructs exceeded 0.70 in all. In addition, the constructs' composite reliability exceeds the 0.70 level suggested by Nunnally (1978) and, as shown in Table 5.25, they range from 0.89 to 1.00.

Table 5.25: Reliability Assessment for Theoretical Model (Cronbach's Alphas and Composite Reliability Index, Large Hospitals, n = 111)

	AVE	Composite Reliability	R Square	Cronbachs Alpha
Management Accounting Systems (MAS)	0.80	0.89	0.49	0.75
Managerial Performance (MP)	0.61	0.90	0.06	0.90
Organizational Structure (OrgStruc)	0.69	0.90		0.85
Perceived environmental uncertainty (PEU)	0.71	0.91		0.87
Technology (Tech)	1.00	1.00		1.00

Table 5.25 explained that there is adequate convergent validity because the average variance extracted (AVE) for all constructs exceeds 0.50. In addition, Table 5.26 shows the outer model loadings for the recommended model. The t-values in all the convergent validity assessments are much greater than 1.96 indicating high convergent validity.

As shown in Table 5.27, the correlation matrix explains, in the off-diagonal, the correlation among constructs and, in the diagonal, the square root of average variance extracted (AVE). Since all diagonal elements in the correlation matrix are greater than their respective off-diagonal elements, these are considered to demonstrate sufficient discriminant validity. As a result, based on the above analysis, the measurement model of this study is reliable and valid.

Table 5.26: Outer Loadings for Theoretical Model (Mean, STDEV, T-Values, Large Hospitals, n = 111, Bootstrapping 500 Samples)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
Decen01 <- OrgStruc	0.878	0.874	0.027	0.027	32.740
Decen02 <- OrgStruc	0.705	0.698	0.062	0.062	11.371
Decen03 <- OrgStruc	0.883	0.883	0.020	0.020	43.922
Decen04 <- OrgStruc	0.850	0.851	0.026	0.026	33.289
Eu08 <- PEU	0.865	0.859	0.039	0.039	22.322
Eu09 <- PEU	0.889	0.889	0.027	0.027	33.497
Eu10 <- PEU	0.807	0.798	0.055	0.055	14.696
Eu11 <- PEU	0.811	0.811	0.050	0.050	16.097
InterC <- Tech	1.000	1.000	0.000		
MP01 <- MP	0.826	0.722	0.215	0.215	3.839
MP02 <- MP	0.758	0.657	0.238	0.238	3.181
MP03 <- MP	0.619	0.527	0.307	0.307	2.017
MP04 <- MP	0.769	0.666	0.198	0.198	3.888
MP05 <- MP	0.834	0.732	0.213	0.213	3.918
MP08 <- MP	0.846	0.757	0.213	0.213	3.967
MasAgg10 <- MAS	0.884	0.886	0.027	0.027	33.346
MasAgg15 <- MAS	0.902	0.901	0.019	0.019	47.533

Table 5.27: Inter-Construct Correlations, Average Variance Extracted (AVE), and Square Root of AVE for Theoretical Model (Large Hospitals, n = 111)

	AVE	Composite Reliability	MAS	MP	OrgStruc	PEU	Tech
MAS	0.80	0.89	**0.89**				
MP	0.61	0.90	0.25	**0.78**			
OrgStruc	0.69	0.90	0.61	0.20	**0.83**		
PEU	0.71	0.91	-0.37	-0.58	-0.12	**0.84**	
Tech	1.00	1.00	0.22	0.06	-0.04	-0.29	**1.00**

5.4.3.2.2 Assessing Structural Model for Large Hospitals

As shown in Figure 5.6 and Table 5.28, technology has significant and positive relationship with management accounting systems information ($\beta = 0.172$, $p < 0.05$), and there are significant and positive relationship between organizational structure and management accounting systems information ($\beta = 0.585$, $p < 0.001$), but there significant negative relationship between perceived environmental uncertainty and management accounting systems information ($\beta = -0.252$, $p < 0.001$). Finally, management accounting systems information has insignificant relationship with managerial performance ($\beta = 0.250$, $p > 0.05$).

Figure 5.6 explains 49 % of the variance in management accounting systems information ($R^2 = 0.487$), and 6 % of the variance in managerial performance ($R^2 = 0.063$). In addition, in accordance with Chin (1998a), 2 of the 4 standardized path coefficients are greater than 0.20 as a minimum value to be meaningful (the range of these paths was between -0.252 to 0.585). These 2 paths presented t-values ranging from 4.259 to 12.186 that all reached at least a 0.05 significant level (see Table 5.28). Moreover, all significant constructs display

strong positive loadings and high levels of statistical significance for all items (see Tables 5.26 and 5.27).

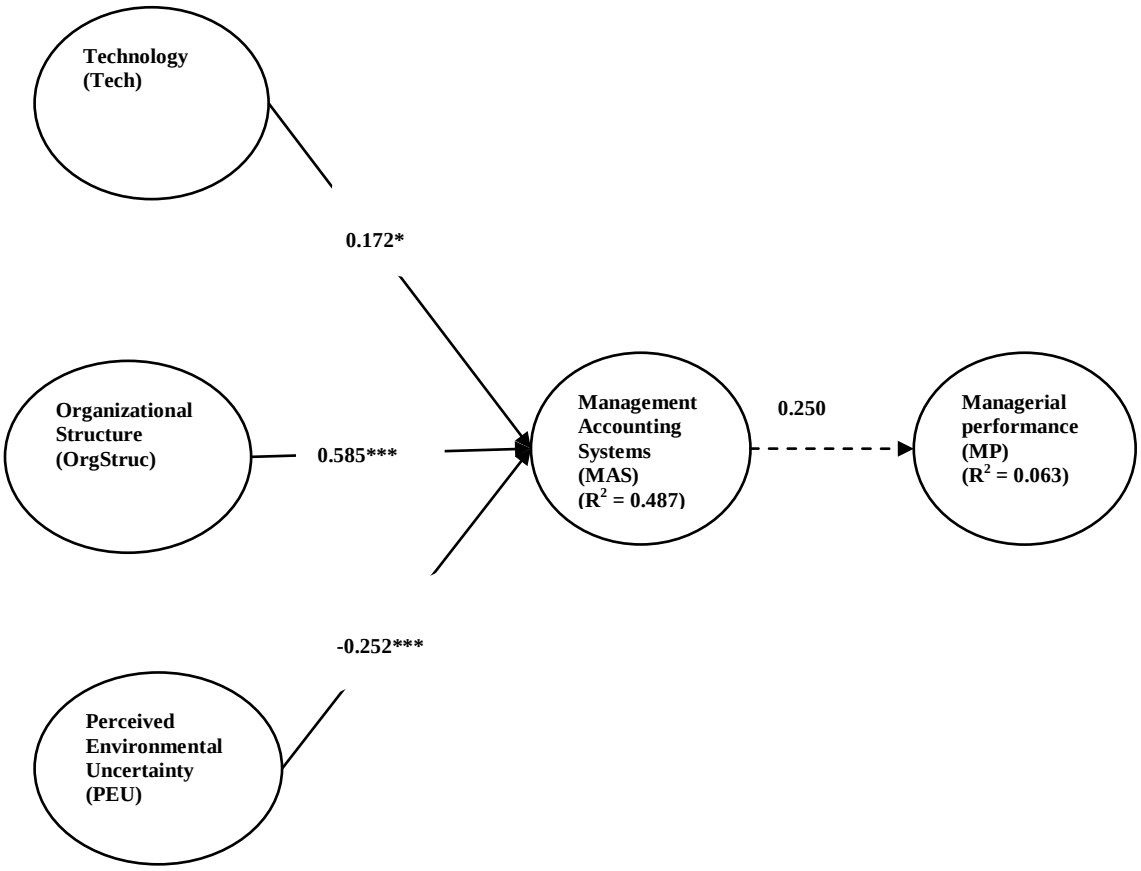

Figure 5.6: PLS Results for Theoretical Model (Large Hospitals)

* P < 0.05 level (n = 111, t critical value =1.960); ** p < 0.01 level (n = 111, t critical value = 2.576); *** p < 0.001 level (n = 111, t critical value = 3.291)

Table 5.28: Path Coefficients for Theoretical Model (Mean, STDEV, T-Values, Large Hospitals, n = 111)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (|O/STERR|)
MAS -> MP	0.250	0.266	0.185	0.185	1.354
OrgStruc -> MAS	0.585	0.582	0.048	0.048	12.186
PEU -> MAS	-0.252	-0.257	0.059	0.059	4.259
Tech -> MAS	0.172	0.173	0.070	0.070	2.465

5.4.3.2.3 Multiple Group Analysis (Small and Large Hospitals)

Bootstrapping, Tables 5.24 and 5.28, shows standard errors' inequality in the two groups (small and large hospitals). This study followed Eberl (2010, p. 497) who stated, "Should there be evidence of the standard errors' inequality in the two groups, the test statistic can be computed as Chin (2000)":

$$t = \frac{Path_{Sample1} - Path_{Sample2}}{\sqrt{s.e.^2{}_{sample1} + s.e^2{}_{sample2}}}$$

Where:

$Path_{Sample1/2}$ = original sample estimate for the path coefficient in both subsamples respectively (from bootstrapping Table 5.24 and Table 5.28)

$S.e._{Sample1/2}$ = standard error of the path coefficient in both subsamples respectively (from bootstrapping Table 5.24 and Table 5.28)

Accordingly, this formula was used to compute *t* values as explained in Table 5.29.

Table 5.29: Results of Multiple Group analysis for Small and Large Hospitals

Structural Paths	Small Hospitals (n = 89)		Large Hospitals (111)		*t*
	$Path_{sample1}$	$S.e_{sample1}$	$Path_{sample2}$	$S.e_{sample2}$	
MAS -> MP	0.702	0.042	0.250	0.185	2.383*
OrgStruc -> MAS	0.395	0.113	0.585	0.048	-1.548
PEU -> MAS	-0.447	0.087	-0.252	0.059	-1.855
Tech -> MAS	-0.034	0.108	0.172	0.070	-1.601

* P < 0.05 level (t critical value =1.960); ** p < 0.01 level (t critical value = 2.576); *** p < 0.001 level (t critical value = 3.291)

As shown in Tables 5.24, 5.28, and 5.29, there are significant differences between the two groups in the relationship between management accounting systems information and managerial performance (t = 2.383, p < 0.05). In small hospitals (the majority is private), there is a significant positive relationship between management accounting systems information and managerial performance (β = 0.702, p < 0.001). While in large hospitals (the majority is governmental) there is insignificant relationship between management accounting systems information and managerial performance (β = 0.250, p > 0.05). These results support the empirical findings of Hassan (2005, p. 135)'s case study that stated, "Physicians and accountants find it difficult to use the new costing systems in their 'public' hospital. However, the same groups accept the same systems either in their private practices or in private sector hospitals".

Accordingly, the above results of multiple group analysis provide partial support for the main hypothesis H8.

5.5 SUMMARY OF HYPOTHESES TESTING

Table 5.30 provide the summarized results of the hypotheses testing.

Table 5.30: Results of Hypotheses Testing

Research Questions	Objectives	Hypotheses	Sub-hypotheses	Results
1. How these contextual factors (technology, organizational structure, and perceived environmental uncertainty) influence the extent of use of management accounting systems (MAS) information in Egyptian hospitals?	1. To determine the influence of contextual factors (technology, organizational structure, and perceived environmental uncertainty) on the extent of use of management accounting systems (MAS) information in Egyptian hospitals.	H1: there is a positive relationship between technology and the extent to which managers use management accounting systems (MAS) information.		Not Supported
			H1a: there is a positive relationship between task variability and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information	partially Supported
			H1b: there is a positive relationship between task analysability and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information	Not Supported

(Continued)

Table 5.30: Results of Hypotheses Testing (Continued)

Research Questions	Objectives	Hypotheses	Sub-hypotheses	Results
			H1c: there is a positive relationship between interdependence and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information	Partially Supported
		H2: there is a positive relationship between organizational structure and the extent to which managers use management accounting systems (MAS) information		Supported
			H2a: there is a positive relationship between decentralization and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information	Supported
		H3: there is a positive relationship between perceived environmental uncertainty and the extent to which managers use management accounting systems (MAS) information		Not Supported

(Continued)

Table 5.30: Results of Hypotheses Testing (Continued)

Research Questions	Objectives	Hypotheses	Sub-hypotheses	Results
			H3a: there is a positive relationship between perceived environmental uncertainty and the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information	Not Supported
2. Which dimensions of management accounting systems (MAS) information enhance managerial performance in Egyptian hospitals?	2. To determine the prominent dimensions of management accounting systems (MAS) information that enhances managerial performance in Egyptian hospitals.	H4: There is a positive relationship between the extent to which managers use management accounting systems (MAS) information and managerial performance.		Supported
			H4a: There is a positive relationship between the extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information and managerial performance.	Supported

(Continued)

Table 5.30: Results of Hypotheses Testing (Continued)

Research Questions	Objectives	Hypotheses	Sub-hypotheses	Results
3. Does management accounting system (MAS) information mediate the relationship between contextual factors (technology, organizational structure, and perceived environmental uncertainty) and managerial performance?	3. To examine whether management accounting system (MAS) information mediate the relationship between contextual factors (technology, organizational structure, and perceived environmental uncertainty) and managerial performance	H5: The extent to which managers use management accounting systems (MAS) information mediates the relationship between technology and managerial performance.		Not Supported
			H5a: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between task variability and managerial performance.	Not Supported
			H5b: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between task analysability and managerial performance.	Not Supported

(Continued)

Table 5.30: Results of Hypotheses Testing (Continued)

Research Questions	Objectives	Hypotheses	Sub-hypotheses	Results
			H5c: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between interdependence and managerial performance.	Not Supported
		H6: The extent to which managers use management accounting systems (MAS) information mediates the relationship between organizational structure and managerial performance.		Not Supported
			H6a: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between decentralization and managerial performance.	Not Supported
		H7: The extent to which managers use management accounting systems (MAS) information mediates the relationship between perceived environmental uncertainty and managerial performance.		Not Supported

(Continued)

Table 5.30: Results of Hypotheses Testing (Continued)

Research Questions	Objectives	Hypotheses	Sub-hypotheses	Results
			H7a: The extent to which managers use management accounting systems (MAS) that provide broad, timely, aggregated, and integrated information mediates the relationship between perceived environmental uncertainty and managerial performance.	Not Supported
4. Does hospital size affect the relationship between contextual factors (technology, organizational structure, and perceived environmental uncertainty), management accounting systems information, and managerial performance?	4. To examine whether hospital size affect the relationship between the contextual factors (technology, organizational structure, and perceived environmental uncertainty), management accounting systems information, and managerial performance.	H8: there is a positive effect for hospital size on the relationship between contextual variables (technology, organizational structure, and perceived environmental uncertainty), management accounting systems (MAS) information, and managerial performance.		Partially Supported

5.6 SUMMARY

Regarding the research method in this research, partial least squares (PLS) is appropriate because of its capability to handle a relatively small sample size for structural model estimation. However, it has its own implications. For example, "PLS tends to overestimate the measurement paths" that connect constructs to their indicators and it is inclined to underestimate the structural paths that are positively biased towards their loading estimates (Chin et al., 2003).

The causal relationships between the fourteen constructs; Management Accounting Systems (MAS) information, Scope (Scop), Timeliness (Tim), Aggregation (Agg), Integration (Int), Technology (Tech), Task Variability (Tv), Task Analysability (Ta), Interdependence (Interdep), Organizational Structure (OrgStruc), Decentralization (Decen), Perceived Environmental Uncertainty (PEU), Hospital Size (size), and Managerial Performance (MP) were examined. Eight main sets of hypotheses were formed based on theory-based, previous studies and frameworks, and they were tested with the collected data utilizing partial least squares (PLS) estimation. According to (Chin, 1998a; Chin et al., 2003), the path coefficients have to be above 0.20 to be meaningfully related to the constructs or the relationship can be further examined by the t-value to show the significance of the path.

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 INTRODUCTION

The general objective of the current study is to provide empirical evidence on contextual variables (technology, organizational structure, perceived environmental uncertainty, and hospital size) and management accounting systems (MAS) information relationships, and their impact on managerial performance in the hospital industry within the Egyptian context. The current chapter provides a comprehensive discussion on the findings reported in chapter 5, specifically, on the hypotheses testing results. It discusses the extent to which the analyses that were conducted and the results reported in chapter 5 are able to give answers to the study questions and achieve the study objectives set out at the beginning of the study process. In addition, the current chapter segregates the discussion of the findings according to the research questions presented in chapter 1. Consequently, to contribute to the body of knowledge, which, in turn, leads to enhance the literature on management accounting systems design, the theoretical implications of the study are discussed. Later, a section discussing the implications of the findings for practice is presented; also, the study's potential limitations are discussed. For future research, a number of suggestions are presented in overcoming such limitations. Finally, this chapter ends with concluding remarks on the overall thesis.

6.2 CONTEXTUAL FACTORS THAT INFLUENCE MAS DESIGN IN EGYPTIAN HOSPITALS

6.2.1 Technology and MAS Information

The insignificant relationship that reported in chapter 5 do not support the main hypothesis (H1) concerning the positive relationship between technology and the extent to which managers use management accounting systems information. This result indicates that the process of Egyptian hospitals, which includes people, knowledge, software, hardware and materials not influence the extent of use of management accounting systems information. In the next sections, the results of technology's dimensions were discussed.

6.2.1.1 Task Uncertainty and MAS Information

As shown in chapter 5, the positive relationship between task variability and the extent to which managers use management accounting systems that provide broad, timely, aggregated, and integrated information (sub-hypothesis H1a) is partially supported. Task variability is significantly and positively associated with scope. This result indicates that the duties of clinical unit managers are moderately repetitious and they think that their work is routine. Therefore, they are less likely to use broad scope information, which relates to possible future events and any quantification of the likelihood of future events occurring. This result is consistent with the study of Daft and Macintosh (1981) that found that the relationship between task variability and the amount of information processed is positive. In addition, this result is consistent with Specht's (1986) empirical results in which complex, non-routine tasks with low analyzability required less precise information

and more information processing than simple and routine tasks. In addition, there is a significant positive association between task variability and timeliness. This result shows that there is moderate routine in clinical unit managers' work. Consequently, they are less likely to use the information that arrives immediately upon request or supplied automatically upon its receipt into information systems or as soon as processing is completed. In addition, the delay between events occurs and relevant information being reported to them or providing reports infrequently has less effect on their work. Moreover, the relationship between task variability and integration is significant and negative. This result reveals that as the duties of clinical unit managers are moderately repetitious and their work is routine, they use more information on precise targets for the activities of all sections within their departments and information that relates to the impact of their decisions on the performance of their departments. Finally, the insignificant path between task variability and aggregation indicates that due the moderate routine existing in clinical unit managers' work. The information provided on the different sections or functional areas in their hospital are less important. In addition, the information in formats suitable for input into decision models and information on the effect of different sections' activities on summary reports for their units and the overall hospital are also less important.

Furthermore, the sub-hypothesis (H1b) of the existing positive relationship between task analysability and the extent to which managers use management accounting systems that provide broad, timely, aggregated, and integrated information is not supported. Task analysability is significantly and negatively associated with scope. This result indicates that clinical unit managers rely more on established procedures and practices to do their work and they have an understandable sequence of steps that can be followed in carrying

out the work in their departments (less task analysability). Therefore, they are less likely to use broad scope information, which relates to possible future events and any quantification of the likelihood of future events occurring. The significant positive path between task analysability and timeliness indicates that due to the low difficulty that faces clinical unit managers in searching for solutions to problems that appear in their work. They are less likely to use the information that arrive immediately upon request or be supplied automatically upon its receipt into information systems or as soon as processing is completed. In addition, the insignificant path with aggregation reveals that because of the moderate routine and the easy to find solutions for work problems, the use of aggregated MAS information is not important to clinical unit managers. Moreover, the relationship between task analysability and integration is insignificant. This result indicates that the use of integrated MAS information within managers' departments is less important.

6.2.1.2 Departmental Interdependence and MAS Information

The results in chapter 5 provided partial support for the sub-hypothesis (H1c) of existing positive relationship between interdependence and the extent to which managers use management accounting systems that provide broad, timely, aggregated, and integrated information. There is a significant negative relationship between interdependence and scope, which indicates that despite there is a moderate reciprocal and sequential work flow between hospital departments, the clinical unit managers are less likely to use broad scope information, which relates to possible future events and any quantification of the likelihood of future events occurring. This result is surprising and is opposite to what was expected for using more broad scope MAS information to deal with these interdependencies. These results are contrary to the results of Macintosh and Daft (1987) who found that

departments emphasized standard operating procedures (indicating the use of narrow scope information) under conditions of pooled interdependence. While under conditions of sequential interdependence, departments emphasized budgets and statistical reports. Finally, reciprocally interdependent departments de-emphasized formal control and emphasized high subjective forms of control (indicating the use of broad scope information). In addition, these results are not consistent with the results obtained by Chenhall and Morris (1986). They found that high interdependence was associated with broad scope MAS. In Egyptian hospitals, the main possible cause for the significant negative relationship between interdependence and scope is the new management accounting systems that have been provided during healthcare reform (before the reform era, the Egyptian uniform accounting systems only provided a budgetary systems as a mechanism used in the Egyptian health sector). As Hassan (2005, p. 135) explained, "These new systems included full costing, standard costing, and simple internal reporting systems" that are not relevant with the changes in the Egyptian hospital environment (Hassan, 2005; Johnson & Kaplan, 1987; Kaplan, 1984).

Furthermore, the significant negative relationship with timeliness indicates that clinical unit managers with moderate interdependence are less likely to use timely MAS information. As expected, there are significant and positive relationships between interdependence and both aggregated and integrated MAS information. These results indicate that due to the moderate interdependence between departments within hospitals, managers are more use for high aggregated information that provided for the different sections or functional areas in the hospital. In addition, managers are more use for information in formats suitable for input into decision models and information on the effect

of different sections' activities on summary reports for their departments and the overall hospital. In addition, the managers are more use for integrated MAS information to coordinate between departments that have moderate interdependencies. These results are consistent with the results obtained by Chenhall and Morris (1986), who found that high interdependence, was associated with management accounting systems that focus on appropriate aggregations and integrative information.

In addition, organizationally, the Egyptian healthcare system is more complex; therefore, high integrated information from the management accounting systems indicates that the clinical units in Egyptian hospitals have high complexities and interdependencies among them. Due to the greater number of clinical units in the hospital, there is a greater need for the more sophisticated information characteristics of integration for coordination between interdependent subunits in this hospital. In Egyptian hospitals, high interdependence occur in inpatient settings, for example, in an emergency department the team of physicians works together to perform a complex surgery or administer urgent care to the patient. Also, physicians in the hospital-based specialties of radiology and pathology coordinate with each other to process cases that come through their respective departments. Even in outpatient settings, physicians' coordination improve the collective output and quality by consult with each other on cases to determine the best treatment plan.

6.2.2 Organizational Structure and MAS Information

The results concerning the positive relationship between organizational structure and the extent to which managers use management accounting systems information supported the main hypothesis (H2). This result indicates that the way in which individuals, parts, and

elements in Egyptian hospital arranged has a positive influence on the extent of use of management accounting systems information.

In addition, the results indicated that there is a positive relationship between decentralization and the extent to which managers use management accounting systems that provide timely, aggregated, and integrated information (supported sub-hypothesis H2a). The results for positive relationships between decentralization and both aggregated and integrated information are consistent with those found by Chenhall and Morris (1986). As suggested by Chenhall and Morris (1986), the clinical unit managers seem to prefer to use information aggregated by various forms such as by time period, functional areas, or decision models. These managers also tend to use information that is integrated in a way that reflects the interrelationships among their sub-unit activities. They use more integrated MAS information to coordinate between their departments in the highly decentralized hospital and to explain the impact of their decisions on other departments throughout their hospital. Also, using more integrated MAS information would enable the managers to influence other managers' decisions and actions within their area of responsibility. As department managers are given greater level of autonomy, they require only certain important information on the different sections or functional areas of their hospital so as to reduce information overload during their decision-making processes.

Nevertheless, not all decentralized departments require higher use of such aggregated and integrated information. Perhaps, only those departments that provide administrative support services may require higher use of such information. One example of administrative support department is medical store department which is responsible for

managing the inventory of hospital supplies to other departments such as clinical wards, operation theatre, laboratory, and radiology departments (Ramani, 2004).

Furthermore, the results reveal that in the decentralized departments, managers who are accountable for both costs and throughput targets need more timely information in terms of frequency and speed of reporting. This is in line with the nature of hospitals as service organizations that give most priority to patients' lives. The timeliness of MAS information can influence the physicians' ability to respond quickly to the events within their hospitals.

In addition, the insignificant relationship between decentralization and scope of MAS information is consistent with the results of Mangaliso (1995). One possible explanation for the insignificant relationship between decentralization and scope is due to the use of traditional costing system such as full costing, standard costing, and simple internal reporting systems that are not relevant to the changes in the Egyptian hospital's environment. The reliance on such traditional costing system tends to deemphasize the use of broad scope information that has the characteristics of external-oriented, non-financial-oriented and future-oriented information.

6.2.3 Perceived Environmental Uncertainty and MAS Information

The significant and negative result that reported in chapter 5 do not support the main hypothesis (H3) concerning the positive relationship between perceived environmental uncertainty and the extent to which managers use management accounting systems (MAS) information. This result reveals that the Egyptian hospitals' internal and external environment have negative influence on the extent of use of management accounting

systems information.

In addition, the sub-hypothesis (H3a) that relates to the existing positive relationship between perceived environmental uncertainty and the extent to which managers use management accounting systems that provide broad, timely, aggregated, and integrated information is not supported. Perceived environmental uncertainty is significantly negatively associated with scope; this result indicates that despite clinical unit managers often can determine the outcomes and the consequences of making decisions before they are made. Moreover, they can consider alternative courses of action before making a decision to follow a specific course of action (low PEU). They are more use for broad scope MAS information. This result is surprising when compared with previous studies, some researchers (e.g., Chenhall & Morris, 1986; Mangaliso, 1995; Mia, 1993) provided evidence that the relationship between perceived environmental uncertainty and broad scope MAS information is significantly positive. In addition, in the Egyptian context, Hassab Elnaby et al. (2003) found that the relationship between accounting development (the development of the accounting profession and the system of accounting education) and two of the environmental factors (economic and political) is positively strong and varies with time. As such, in line with assertions of Libby & Waterhouse (1996) and Preston (1995), hospitals are required to produce greater volumes and varieties of information about the future as well as about the past, about events within the hospital and about external events in the environment. This is particularly true for those departments that provide administrative support services such as accounting and medical supply departments. The study findings not confirm what Drury (2004, p. 699) argued that financial data alone will not adequately reflect managerial performance in high

environmental uncertainty, however, under low environmental uncertainty these data would be adequate.

In addition, the significant negative relationship with timeliness reveals that clinical unit managers are more use for information that arrives immediately upon request frequently on a systematic and regular basis in low PEU situation. The significant negative relationship between perceived environmental uncertainty and timeliness is contrary to the findings of Chenhall and Morris (1986), and Mangaliso (1995), in which timely information, in uncertain situations, helps managers to respond rapidly to unpredictable changes. The results also show that there is a significant and negative relation between perceived environmental uncertainty and aggregation, which indicates that despite the low perceived environmental uncertainty facing clinical unit, the managers are more use for high aggregated information that is provided on the different functional areas in the hospital. In addition, they are more use for information concerning the effect of different sections' activities on their units and the overall hospital. This result is inconsistent with Mangaliso's (1995) findings that in uncertain environments the managers perceived aggregated information to be strategically useful because it assists them see the whole situation and improve their capability to use intuition and judgement.

Moreover, the significant negative relationship between PEU and aggregation is consistent with some studies in the hospital context such as (e.g., Hill, 2000; Kettelhut, 1992; Pizzini, 2006). These studies found hospitals that face greater external pressure to control costs require more extensive and detailed accounting information (indicating low aggregated information) when operating in markets with strong competition and/or significant

penetration from manage-care organizations (Hill, 2000; Kettelhut, 1992). Similarly, hospitals face greater external pressure to control costs when treating a large proportion of patients covered by Medicare or management-care plans, because these payers often impose a risk of cost overruns upon the hospitals using fixed-price reimbursement contracts. Therefore, to control costs, these hospitals may need sophisticated accounting systems that can provide more cost information detail, classify and report frequently (Pizzini, 2006). In the context of hospitals, perhaps only those departments that provide administrative support services may require higher use of aggregated information under low perceived environmental uncertainty. Finally, the significant negative relationship with integration indicates that the managers are more use for integrated MAS information to coordinate between their departments with low perceived environmental uncertainty. As Egyptian hospitals structure is quite decentralized (because clinical units under health care reform are treated as a business unit, and clinical unit managers are accountable for both costs and throughput targets), presence of information needed for decision making increases when the hospitals managers tend to work in team and more emphasis given to information that crosses functional boundaries, particularly in those more specialized departments.

6.3 The Role of MAS Information in Enhancing Managerial Performance in Egyptian Hospitals

The significant and positive path between management accounting systems information and managerial performance supported the main hypothesis (H4). This result indicates that management accounting systems information provides motivation to Egyptian hospitals' managers to enhance their performance.

In addition, the results provided support for a positive relationship between the extent to which managers use management accounting systems that provide broad, timeliness, and integrated information and managerial performance (sub-hypothesis H4a). These results indicate that clinical unit managers are more use for broad scope, timely, and integrated MAS information to enhance their managerial activities, namely, planning, investigating, coordinating, evaluating, supervising, and representing. However, in the case of highly decentralized hospitals, too broad information may be less useful for those highly specialized clinical units. In contrast, the aggregated information, which provided on the different functional areas and on the effect of different sections' activities on their units and the overall hospital in format suitable for input into decision models, is less important and it may hinder and make their performance dysfunctional.

These results are quite consistent with those found by Soobaroyen and Poorundersing (2008) where broad scope, timeliness, and integrated MAS information are positively related to managerial performance. However, contrast with Soobaroyen and Poorundersing's (2008) study, the current study indicates that aggregated information do not seem to influence the clinical unit managers of Egyptian hospitals. One plausible explanation to this outcome is perhaps due to the unique characteristics of each clinical department in the hospitals where each provides a specialized and different service. Hence, the use of aggregated data or information may be less useful under such condition when evaluating clinical unit managers. This argument is in line with Ramani's (2004) remarks that hospitals performance needs to be monitored at the level of each individual clinical department. For example, the performance of each laboratory department (e.g. pathology,

biochemistry, microbiology, etc.) and each radiology department (e.g. x-ray, sonography) requires independent monitoring due to the basic differences in the nature and type of investigations carried out by the investigation departments (Ramani, 2004). Perhaps, for these types of departments, the ability to monitor more detailed costs, rather than merely aggregating costs, is critical because it allows hospitals to track the costs by patient (Hill, 2000). However, too much information details (low aggregated information) may cause dysfunctional decision-making and hamper performance of clinical unit managers.

Moreover, it is very important that some kind of coordination of activities among the various departments is implemented that requires the use of integrated information. Consequently, integrated information is highly used within Egyptian hospitals, and it influences the managers' performance. Therefore, as suggested by Ramani (2004), for Egyptian hospitals, the decision to implement a management information system, such as MAS, has to be made at the top management level with its implementation requires the cooperation of each and every officer in the field.

6.4 MAS Information Mediates the Relationship between Contextual Factors and Managerial Performance

As shown in chapter 5, management accounting systems information does not mediate the relationships between contextual variables (technology, organizational structure, and perceived environmental uncertainty) and managerial performance. Therefore, the main hypotheses (H5), (H6), and (H7) not supported respectively.

In addition, management accounting systems that provide broad, timely, aggregated, and integrated information do not mediate the relationship between theoretical model's dimensions (task variability, task analysability, interdependence, decentralization, and PEU) and managerial performance; therefore, the sub-hypotheses H5a, H5b, H5c, H6a, H7a are not supported respectively.

The result related to task uncertainty (task variability, and task analysability) is similar to the result of Soobaroyen and Poorundersing (2008), in a developing country context in the manufacturing sector, who found MAS information characteristics (broad scope, timely, aggregated and integrated information) do not mediate the relationship between task uncertainty and managerial performance. In addition, the result related to interdependence is opposite to the results of the empirical analysis done by Gerdin (2005a), based on data from 132 production managers in Swedish manufacturing organizations, that provided evidence that the use of greater amounts of management accounting systems information (broad scope information) for decision-making plays a mediating role through linking departmental interdependence indirectly to subunit performance. However, the current study findings are consistent with the same study by Gerdin (2005a) who did not find evidence that more frequent (timeliness) use of management accounting systems information played a mediating role between the same relationships.

According to decentralization the result is contrary to the study of Soobaroyen and Poorundersing (2008) in which it was found that all management accounting systems information characteristics (broad scope, timeliness, aggregation, and integration) play a mediating role between decentralization and managerial performance. They concluded that

only the availability of broad scope, timely, more aggregated, and more integrated MAS information catalyses the decentralization policies to be effective on managerial performance. Finally, the result relating to perceived environmental uncertainty is contrary to Chong and Chong's (1997) result in that high perceived environmental uncertainty induces managers, when they make decisions, to use broad scope information. Their finding implies that there is a mediating role for broad scope information between perceived environmental uncertainty and performance, partially due to the indirect effect of the extent of use of broad scope information by managers for decision-making.

The main possible cause for no mediating effect of all the MAS dimensions (scope, timeliness, aggregation, and integration) on the relationships between contextual variables' dimensions (task variability, task analysability, interdependence, decentralization, and PEU) and managerial performance in Egyptian hospitals context is the resistance within Egyptian hospitals (especially among physicians) against the new management accounting systems that were provided during healthcare reform (prior to the reform, only budgetary system existed as a part of the Egyptian uniform accounting system). The reform provided new management accounting systems that discuss and define health problems in terms of cost centres, product costing, standard clinical episode and clinical performance measures. The managers disliked these systems arguing that it is inappropriate to standardise and simplify clinical processes in such managerial procedures. In addition, accountants prepare costing reports that were acted upon to investigate clinical managers' decisions. Physicians did not welcome this change, because it conflict with the autonomy they had in the pre-reform era, and it disrupt their hospitals traditions (Hassan, 2005) . Also, the new MAS that were provided during healthcare reform do not adequately reflect managerial

performance in high environmental uncertainty. In addition, the new systems aim to make decision making more centralized. As a result, the managers of clinical units in centralized hospitals have insufficient authority to influence the design of accounting systems due to the centralized authority for making decisions. Therefore, this situation will predict the resistance of the managers of clinical units to the accounting changes and innovation.

6.5 EFFECT OF HOSPITAL SIZE ON THE RELATIONSHIP BETWEEN CONTEXTUAL VARIABLES, MAS INFORMATION, AND MANAGERIAL PERFORMANCE

As shown in chapter 5, the results provided partial support for hypothesis (H8) for a positive effect for hospital size on the relationships between contextual variables (technology, organizational structure, and perceived environmental uncertainty), management accounting systems information, and managerial performance. In small hospitals (the majority is private), there is a significant positive relationship between management accounting systems information and managerial performance. While in large hospitals (the majority is governmental) there is insignificant relationship between management accounting systems information and managerial performance. These results are consistent with the empirical findings of Hassan (2005, p. 135)'s case study that stated, "Physicians and accountants find it difficult to use the new costing system in their 'public' hospital. However, the same groups accept the same systems either in their private practices or in private sector hospitals".

Furthermore, the results that indicate that there is insignificant relationship between management accounting systems information and managerial performance in large Egyptian hospitals is inconsistent with the results from previous studies either in manufacturing or hospitals context in western literature. In the manufacturing context, numerous studies (e.g., Al-Omiri & Drury, 2007; Baker & Hall, 2004; Brown et al., 2004; Choe, 1996; Guilding, 1999; Libby & Waterhouse, 1996; Merchant, 1981, 1984) found that organizational size is positively related to accounting sophistication and control systems. Also, in the health care sector, large hospitals have advantages from using more sophisticated accounting systems because these hospitals have the ability to allocate the fixed costs of system development on a larger number of beds (Hill, 2000). In addition, two types of control related with organizational size were identified by Bruns and Waterhouse (1975); the first type is administrative control with big organizations while the second type is personal control with small organizations. In this matter, based on the empirical data collected from 1,441 hospitals in the USA, Wang, Wan, Burke, Bazzoli, and Lin (2005) found that large hospitals have a high probability of implementing administrative information systems compared to small hospitals. However, Pavlatos and Paggios (2009) in the Greek hospitality industry, found no association between accounting systems functionality and hotel size.

6.6 IMPLICATIONS OF THE STUDY

From the results of the current study there are theoretical and practical implications. First, the examination of the contingency and work performance theory in the healthcare system in a developing country context represents the principal relevance of these results at the

level of theory. In addition, control and management accounting systems design represents a critical area for the practical implications of the results of this study.

6.6.1 Theoretical Implications

The research results have enabled one to further explain some of the traditional contingency and organizational theories. Also, by producing results with theoretical implications, the current study seeks to contribute to the literature of management accounting systems design through filling the empirical gap that exists within developing countries, especially in the Egyptian context (see, Triest & Elshahat, 2007). In addition, in Africa, this study is one of the few studies of management accounting systems (e.g., Soobaroyen & Poorundersing, 2008), and, to date, other than Hassan's (2005) case study, there is no empirical research on the use of management accounting systems information in Egyptian hospitals. In the hospital industry, to date, despite the relationships between contextual variables and cost/management accounting systems and their impact on organizational or managers' performance have been partially examined through only few studies done in Western context (e.g., Abernethy & Brownell, 1999; Abernethy & Lillis, 2001; Cardinaels et al., 2004; Counte & Glandon, 1988; Devaraj & Kohli, 2000; Hill, 2000; Hill & Johns, 1994; K. K. Kim, 1988; C. M. Lawrence, 1990; Pizzini, 2006). The Egyptian hospitals context has unique feature as Egypt a developing country in transition, as mentioned before, the study of Triest and Elshahat (2007) indicated that the use and sophistication of managerial and costing information is limited in manufacturing sectors. As known, the service sectors, especially hospitals sector, late behind manufacturing sectors in applied these systems. In addition, "In the pre-reform era, there was a lack of concern about the need for accurate and reliable performance information in Egyptian

hospitals" (Hassan, 2005, p. 131). As a result, there are no financial and non-financial indicators available to evaluate the performance of Egyptian hospitals like Western hospitals. Consequently, the current study struggle to provide preliminary road map about the extent of use new management accounting systems that provided during health care reform.

Despite Fisher (1998) argued that the relationships and causality among the contingent variables are difficult to uncover by examining variables in isolation. The majority of MAS contingency-based studies that were conducted in other industries like manufacturing sector (e.g., Chia, 1995; Chong & Chong, 1997; Gerdin, 2005a; Mia, 1993; Mia & Clarke, 1999; Soobaroyen & Poorundersing, 2008) were examined variables in isolation. Whereas the current study provides a contribution to the development of management accounting systems in hospitals by examining many contingent variables (technology, organizational structure, perceived environmental uncertainty, and organizational size) in one model using management accounting systems information as an intervening variable between these variables and managerial performance.

6.6.2 Practical Implications

From these research findings, there are practical implications in one critical area, which is, control and management accounting systems design. This study provides a better understanding of the relationships between the contextual variables, management accounting systems information use and managerial performance for designers of management accounting systems, particularly, for enhancing managerial performance in hospitals, and for the policy makers responsible for the reform of healthcare system. For

example, since management accounting systems supply information to assist managers in decision-making, it assists them to determine their current, past and future directions. The current study offers to the managers some useful aspects related to the function of management accounting systems information that can be used to enhance their managerial performance. The provision of better information facilitates more effective managerial decisions, which, in turn, enhances organizational performance (Cadez & Guilding, 2008). In addition, the current study may provide Egyptian policy makers, who are responsible for the reform of the healthcare system, with some direction to reorganize the Egyptian hospitals and help them to close the gap between private and governmental hospital practices.

The results suggest that when there is an appropriate fit between contextual variables (technology, organizational structure, perceived environmental uncertainty, and organizational size) and management accounting systems information, the decision-facilitating role of management accounting systems can enhance managerial performance. In addition, the ability of management accounting systems designers to understand what types of management accounting systems information are suitable in different circumstances will improve in the light of the results of the current study. Consequently, this will improve the probability that management accounting systems information will help hospital managers to improve their performance and that of their hospitals. In this respect, because of the absence or partial support for the positive relationship between technology (task variability, task analysability, and interdependence) and management accounting systems information, the current study provides information for both management accounting systems designers and Egyptian policy makers to re-organize the

Egyptian hospitals to make a fit between technology and management accounting systems information. Also, management accounting systems designers and Egyptian policy makers should emphasize on decentralized decision-making by delegating sufficient authority to lower level managers as much as possible.

In addition, management accounting systems designers and Egyptian policy makers should take cognizance of both the internal and external environment in which Egyptian hospitals operate in designing management accounting systems. The current study offers the hospital managers some useful aspects related to the function of management accounting systems information that can be used to enhance their managerial performance. The provision of broad scope, timeliness, and integration MAS information can facilitate more effective managerial decisions.

Furthermore, the partial support for the existing positive effect of hospital size on the relationship between contextual variables, management accounting systems information, and managerial performance provides motivation to management accounting systems designers and Egyptian policy makers to determine the appropriate hospital size in both private and governmental sectors that will have advantages from using more sophisticated accounting systems.

6.7 LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FUTURE RESEARCH

It is important to stress that this study is quite exploratory. Because this study is one of the few studies done in Africa in the field of management accounting systems (e.g., Soobaroyen & Poorundersing, 2008) and, to the best of one's knowledge, other than Hassan's (2005) case study, there is no empirical research on the use of management accounting systems information in Egyptian hospitals. Therefore, under the research design parameters and a number of limitations, the results of this study should be interpreted and evaluated. First, the choice of sampling frame contributes to some limitations. The sample was only taken by visiting hospitals. Using personally administered questionnaires, the hospitals were visited to distribute the questionnaires to managers or heads of departments within these hospitals and collect the questionnaires after they had been completed by them, thus, the actual population of the hospitals in the whole of Egypt was not considered. As a result, the sample was rather limited and not comprehensive enough.

Given the narrow representation in terms of type and size of hospitals that not cut across geographical regions in Egypt, the findings can be considered to possess a reasonably low degree of generalizability. However, confinement of the sample only to hospitals would provide a potential source to increase the generalizability. Furthermore, the results may not be generalizable to other industries owing to the specific nature of the healthcare sector. In this case, future research should apply management accounting systems information characteristics to other service industries (e.g., banking, education, IT and communication,

and tourism) in order to gain a better understanding of the management accounting systems concepts and its applications.

Second, the cross-sectional nature of the study provides another limitation. Cross-sectional data does not allow the researcher to examine causal linkages. Thus, in future research applying longitudinal study is more appropriate for examining these causal linkages. In addition, the level of analysis is based on the department managers of hospitals situated in a developing country in transition-Egypt. Therefore, a generalization of the research findings to hospitals in other countries and to managers other than the department managers requires caution. Third, there are limitations concerning the measurement of variables. The researcher used Duncan's scale (1971) to measure perceived environmental uncertainty. This scale has shown significant weakness and it is questionable. Also, the reliability of Duncan's scale has been found to be relatively low in previous studies. In addition, measuring managerial performance by using a self-rating scale has been criticized by many researchers (e.g., Prien & Liske, 1962; Thornton, 1968) for having higher leniency errors and higher mean values in the score. In future research, it will be useful to replicate this study using different instruments that may generate significant relationships.

Fourth, the scope of the study is relatively narrow, as it only used management accounting systems information characteristics (the decision-facilitating role of management accounting systems) and focuses on only four kinds of contextual variables. Thus, to identify additional types of congruence or fit effects on managers' performance and on the performance of their hospitals, future research could incorporate different characteristics of management accounting systems (e.g., the decision-influencing role of management

accounting systems) and other contextual variables (e.g., business strategy, and organizational cultural). Also, the linkage between new management practices like TQM and management accounting systems is worth studying in future research because improving quality of care is essential to have patients' satisfaction, and enhance the performance of healthcare systems.

The fifth limitation concerns the respondents where there is always a possibility that they may not be the right person to respond to the questionnaire, or they may have suffered from hindsight bias or forgetfulness, which may affect the quality of the data. In addition, because this study was carried out by way of a questionnaire survey, the weakness of such an instrument may affect the findings. The perceptual nature of data may impose limitations particularly in the managerial performance data and perceived environmental uncertainty. Therefore, the use of multiple methods may be helpful in addressing some of the problems of questionnaire-based research. For future research, the use of both questionnaire survey and experimental or case study methods should further enhance the findings. In addition, the use of secondary data for performance should also be considered where appropriate, as it is more objective.

6.8 CONCLUSION

This study attempts to provide some insights into the design of management accounting systems (MAS) to assist managers to develop and enhance their managerial performance. Although many parties have demonstrated a great deal of interest in management accounting systems design in the manufacturing sector, in the Western context, empirical

surveys on this subject are still limited in healthcare systems and rare in the developing countries context, especially Egypt. By adopting a contingency and work performance theory framework, this study provides a plausible explanation of the relationships between contextual variables, management accounting systems information characteristics and managerial performance within the Egyptian hospital context. In addition, this study may provides attempts to diagnose the reason for the decrease in health care quality in Egypt compare with other countries, and, why, despite the Egyptian health care reform, from 1997 to 2018, the citizens and government recognize that the performance of health sector is still insufficient. Also, it may provides an answer to what Hassan (2005, p. 135) asked in his case study when he called for, "A full investigation and explanation of a resistance" to accounting change in Egyptian hospitals during healthcare system reform.

Furthermore, some implications for the theory and management practices were provided by the results of this study despite the above limitations. The results suggest that when there is an appropriate fit between the contextual variables and management accounting systems design, the decision-facilitating role of management accounting systems can enhance managerial performance. In addition, the abilities of management accounting systems designers to understand what types of management accounting systems are suitable in different circumstances will improve in light of the current study's results. Consequently, this will lead to improve the probability that management accounting systems information will help the hospital managers to improve their performance and that of their hospitals. In addition, the current study may provide to the Egyptian policy makers who are responsible for the reform of healthcare system some direction to re-organize the Egyptian hospitals and help them to close the gap between private and governmental hospitals' practices.

In summary, using the cross-sectional data obtained from the survey of Egyptian hospitals, this study provides a better understanding of the relationships between the contextual variables, management accounting system information use and managerial performance within the context of health care organizations. A contextual factor such as organizational structure is essential factor in designing efficient and effective management accounting system. Hospitals with decentralized structure make better use of timely, aggregated and integrated MAS information. In addition, the absence or partial support for the positive relationship between technology (task variability, task analysability, and interdependence) and management accounting systems information, the current study provides information for both management accounting systems designers and Egyptian policy makers to reorganize the Egyptian hospitals to make fit between technology and management accounting systems information.

Environment in which the Egyptian hospitals operate does have significant and negative influence on the type of information provided by the management accounting systems. Consequently, management accounting systems designers and Egyptian policy makers should take cognizance of both the internal and external environment in designing management accounting systems. Moreover, the current study offers the hospital managers some useful aspects related to the function of management accounting systems information that can be used to enhance their managerial performance. In line with the decision-facilitating role of management accounting systems, the provision of better information, in terms of scope, timeliness, and integrated MAS information, can facilitate more effective managerial decisions, which, in turn, enhances managerial performance. In addition, the

current study may provide Egyptian policy makers, who are responsible for the reform of the healthcare system, with some direction to reorganize the Egyptian hospitals and help them to identify the important elements for improved performance.

Furthermore, the partial support for a positive effect for hospital size on the relationship between contextual variables, management accounting systems information, and managerial performance may provides motivation to management accounting systems designers and Egyptian policy makers to determine the appropriate hospital size in both the private and governmental sectors that will gain advantage from using more sophisticated accounting systems. With the increasing magnitude of health care costs, it is essential that Egyptian hospitals adopt new management accounting and costing systems as part of their management information system to provide better data and greater insights for cost control and cost management for better decision making. Such management accounting and costing system also must fit well with their environment, structure, and technology.

Finally, the insignificant results of this study may be due to the scales used in manufacturing industries being slightly modified to suit health care organizations and the administration of the instrument in a culture other than the one in which the scale was developed. Egyptian settings and context seem to be considerably different from those in western countries.

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