OULU BUSINESS SCHOOL

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THE IMPACTS OF ARTIFICIAL INTELLIGENCE ON MANAGEMENT ACCOUNTING STUDENTS: A CASE STUDY AT OULU BUSINESS SCHOOL, UNIVERSITY OF OULU

Master's Thesis

Accounting

April 2019

Unit	
Department of Accounting	
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Title			
THE IMPACTS OF ARTIFICIAL INTELLIGENCE ON MANAGEMENT ACCOUNTING STUDENTS: A CASE STUDY AT OULU BUSINESS SCHOOL (OBS), UNIVERSITY OF OULU			
Subject	Type of the degree	Time of publication	Number of pages
Accounting	Master's Thesis	April 2019	67

Abstract

The pervasiveness of Artificial intelligence in accounting fraternity has come under serious scrutiny. Artificial intelligence is defined as the intelligence that machines exhibit by imitating human behaviour. AI is altering the roles of accountants. It is redefining the job descriptions of all sectors of professions of which management accountants is not immune to in the global world. There are two begging questions that this study seeks to investigate One concern with the measures put in place by faculty in impacting students with knowledge and skills in AI. The second question concerns the willingness and readiness of management accounting students to adopt the skills and knowledge of AI. The aim of the study is to investigate the impacts of AI on management accounting students. An exploratory design was used to examine the impacts of AI on management accounting students at the Oulu Business School (OBS), University of Oulu. Data was collected through an open-ended interview. Purposive sampling was used to identify eight expertise of whom three were academic professors in accounting, and five were second-year master's degree students from management accounting discipline. Following a qualitative method approach, the investigation involves recording and transcription of the recorded interviews coupled with traditional notes taking which was later coded, categorized, patterned and themes identified. A semi-structured questionnaire was used to obtain the needed information. The study established from the interview reveals that there is an integration of AI in accounting curriculum, there are good textbooks that integrate AI into accounting but insufficient textbooks that combine AI and management accounting, there is student's awareness of AI through a seminar, insufficient expertise to teach AI. Findings from students reveal that students are aware of AI; students are also willing to adopt and learn AI skills. Only a few students are oblivious about adopting the skills and knowledge of AI. Majority of the students have also taken AI related courses in their undergraduate studies. Also, the finding indicated that most students have acquired the basic skills and knowledge in database management. Recommendation for the researcher is that management accounting students must continually improve the knowledge and skills in AI to be a ready market in the global world of work and stay relevance now and the future.

Keywords
Management Accounting, Artificial intelligent, Accounting Education, knowledge, skills
Additional information

Acknowledgments

I want to take this opportunity to first and foremost thank God for being my strength and guide in the writing of this thesis. Without God, I would not have gotten the wisdom or physical ability to do this thesis work. I would like to appreciate the patronage and moral support extended with love, to all my loved ones especially University of Oulu whose financial support and passionate encouragement made it possible for me to complete this project.

I will first use this opportunity to thank my beloved husband (Mark Afari Nana Kwame) for his encouragement and guidance towards my thesis. I really appreciate your time and your love.

I sincerely thank my supervisors Professors Sinikka Moilanen, and Pasi Ojala for their counselling, guidance, advice, and contribution toward my thesis work it was immensely encouraging.i would like to use this opportunity to also thank all my lecturers at the University of Oulu business school.

I would also like to use this opportunity to thank my Pastors, Pastor James, and Pastor Sunday for their encouragement and prayers for me. Also, I would also like to thank my beloved parents, siblings, and friends for their prayers and support.

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ABBREVIATION

AACSB	Association to Advance Collegiate School of Business
ACCA	Association of Chartered Certified Accountants
AI	Artificial intelligence
AICPA	American Institute of Certified Public Accountants
AIT	Accounting Information Technology
CA	Chartered Accountant
CRM	Customer Relationship Management
CIMA	Chartered Institute of Management
ERP	Enterprise Resource Planning
MA	Management Accounting
IBM	International Business Machines
IMA	Institute of Management Accounting
IT	Information Technology
SCM	Supply-chain management
SME`s	Small and Medium-sized Enterprises

1. INTRODUCTION

The purpose of accounting education in the higher institution is the provision of quality graduates. The provision of quality graduates depends on the quality of educational inputs and measures put in place by the institutions. Input quality is the quality of individuals or students who have been admitted to study at the college or university. Quality of inputs refers to the potentials of individuals whose successes are tied to the curriculum offered by the college. The environment of learning will develop the potentials of students who graduate to meet the high standard of organizations. The composition of learning to prepare and produce the quality of the learning process involves a lot of factors and individuals. These include students, teachers or lecturers, teaching methods, learning materials, evaluation of learning and instructional media. (Chrismastuti & Purnamasari, 2015)

Most institution of learning is still using the conventional method of knowledge in management accounting and accounting discipline as a learning tool. Some lecturers are still using old textbooks of accounting to teaching. Some educators or instructors are still using accounting textbooks that have outlived its relevance in our modern times. According to a study conducted by Demski (2007), most students find the old textbooks as archaic and uninspiring. The study further stressed that the successes of the learning process of accounting also depend on the expertise of lecturers who have the requisite skills and knowledge to transfer the understanding of the accounting information and to impacts students with skills and knowledge.

The academic world must help prepared students with current skills to be a ready market for the world because of the influence of Artificial intelligence. According to the Merriam-Webster dictionary (1828), Artificial intelligence is the ``*capability of a Machine to imitate intelligent behaviour*``. We are in an era of AI. The golden age of AI is here with us. The use of pencil and Paper to enter data by an accountant is fading away gradually and becoming a thing of the past because of the emergence of AI. (Greenman, 2015). AI is not only redefining the roles management accountant but also giving new Job description in modern times. Accountants ought to embrace the new waves of specialization and the application of technology in order to survive this new age. (McCabe, 2014).

Accounting discipline is going through a lot of changes by the emergence of AI technology. AI has the ability to process data into meaningful information, store and retrieve information at a faster rate. In view of these, skills and knowledge of management accountant needs to expand in both scope and adaptability. Management Accountants and professionals ought to conceive the idea that AI technology will continuously challenge their current competencies and redefine their roles. This also places a burden on educators or instructors to adapt and adopt to the changes in the management accounting and other accounting disciplines.

In our contemporary times, there is an astronomical growth of technology, and many organizations and institutions have found the need to invest in artificial intelligence to automate and argument their services and products. The application of artificial intelligence and automation has gradually succeeded in reducing the need for human labor. This has created fear, panic and worried about the future state of some professions in our modern times (Manjoo, 2017).

A study conducted by Frey and Osborne (2017) reveals that 702 jobs title is about to be automated. Out of this Job title, the accounting professions top the list with about 94% of its manual operations about to be computerized in the next 20 years (Nagarajah, 2016). AI has been incorporated and integrated into accounting professions which have replaced most of the works that were formerly executed by humans. A typical example of AI is Amelia. Amelia is an AI system which has the ability to understand natural language that allows it to interact with customers. The system understands words and their meaning. The future state of white-collar jobs is at stake because of the rising of artificial intelligence (Twentyman, 2017).

Also, International Business Machines (IBM) has proven the extraordinary tasks that can be performed by AI which will eventually replace humans in the discharge of their duties now and the future. IBM has developed software which can answer any questions in eight different natural languages of human both written and oral. (Tual, 2017).

Artificial intelligence has undergone tremendous successes in recent years. It plays an integral part in promoting business activities. It also plays a crucial role in everything we do and touch. Although AI does not replicate human intelligence, its outputs on a

task-by-task basis far exceed the consistency and accuracy of those produced by humans. We need to identify the strengths and limitations of AI, build a bridge of having computers and humans working together to ensure efficiency. (ICAEW, 2017).

1.1 Background and motivation of the study

Managing an organization is not an easy task. It involves a lot of decision taken to ensure the smooth running of it. Decision-making goes beyond personal ideologies and emotion. It is not placed at the mercies of mere speculations, intuition, and whim. Decision taking affects budgeting, cost allocation, analyses of available options for profitability, short and long-term investment, performance evaluations among others. In view of these, improvised management accounting tools are employed by organizations and institutions to help make every day running of the organization to be systematic and formalized. Management accounting is, therefore, a practical way employed by practical people who use practical tool to handle the practical situation in an organization. Management accounting helps an organization to think before acting, so they do not put the organization in jeopardy. It helps the organization to position itself properly by tracking what goes on in the business organization and distinguish its boundaries as an autonomous body. (Vaivio, 2008)

Artificial intelligence is a seductive technology that is taking industries and organizations by storm. It is penetrating all sectors of industries, organizations and social life. The technology of Artificial intelligence is revolutionizing the accounting discipline. According to the American Institute of Certified Accountant (AICPA), Artificial intelligence is a set of technique whose processes give computers the human-like abilities to see, hear, speak, reason with imprecise or incomplete information and learn. The abilities of AI to reason and learn to have the most interesting potentials for its applications in the accounting fraternities.

In modern times AI is combined with other business software's to help organizations function effectively. For instance, Enterprise resource planning is a type of integrated business management controlled by software and technology to help organizations to

collect data, store the data, manage data and interpret data for many business activities. AI-enabled ERP systems help to streamline routine tasks, eliminate human errors and operating expenses. Integrating AI into CRM provides timely response to customers and provides effective information between companies and their customers. AI has the ability to predict customer interests based on online history and send timely information which enables companies to experience productivity. (CIOreview, 2018).

AI is also applied in commerce to help solve issues in supply chain management. SCM is defined as the process of designing, planning, execution, controlling and monitoring of supply chain activities. The primary purpose of SCM is to create net value, synchronize supply with demand, evaluating performance globally, building a competitive infrastructure and leveraging worldwide logistics. Although AI has been in existence in decades, its potentials have not been fully exploited in the past for SCM. In recent times, AI is used to solve complex problems by searching for information for SCM. Certain sub-areas of AI such as expert systems and genetic algorithm have been fully utilized to help SCM issues like inventory management, location planning, purchasing, freight consolidation, and scheduling challenges. (Min, 2009).

The emergence of Artificial Intelligence to undertake accounting roles in accounting practices, organization and government is a clear signal that management accounting student must position themselves well in their field of study by upgrading their skills and knowledge in AI during their undergraduate studies. We are in an era of AI. The race to exploit the full potentials and the abundant resources of AI are here. Although there are few challenges to the full implementation of AI in many organizations, its opportunities are enormous and can never be underestimated. Organizations that master the emerging discipline of AI stand the chance of reaping its rewards and will have competitive advantages over others.

The future state of management accounting professions and other accounting professions is under serious threat as AI is taking over both routine and non-routine tasks previously performed by humans. Studies conducted by Seek (2017) shows that 40 % of accounting transactions would be automated in the year 2020.

According to the Association of Certified and Chartered Accounting, a global accounting body has added a voice about the uncertainty of accountants in the future. Management accountant and other accounting professions must up their game in the

acquisition of skills and knowledge because a time is coming where the skills they possess now will be of no use in the future. (Galarza, 2017).

In view of these developments, there must be sufficient motivation for the integration of AI into management accounting education from external and internal influencers from the academic world. Reason being that, AI in management accounting education helps to prepare accounting students for the professional world. According to a survey conducted by Bandy (1990), the main purposes of accounting education should not only be the teaching of accounting to students but also teaching students with the requisite knowledge to become accountants.

1.2 Business and Accounting

The world market is very volatile and unpredictable. The business environment is highly competitive, and so the act of taking a decision is very key to the successes of any organization or institution. Decision-making is very complex, but it plays a significant role in the daily operational activities of an organization. Due to the competitiveness and survival to make a mark at the global marketplace, organizations are beefing up their game in improving the efficiency and dexterity of the decision-making process. Many modern organizations, either small or large are making an effort to invest and adopt new management information system to enhance their service delivery as technology expands. Decision-taking largely depends on the availability of the right information at the right time. Major key players and managers of an organization depend on the internal source of information and skillful people who are trained to provide accurate and timely information to run the organization. (Akram, 2011)

The main purpose of business establishment is to provide goods and services to customers or clients in exchange for financial benefits or maximize profits. (Collier ,2003). One of the eminent thinkers of the subject of management a man by the name Peter Drucker argues that "the purpose of business is to create and keep a customer." (Atrill & McLaney, 2009) Business is about people, markets and operational activities, that is, services and product delivery. Business is not accounting, but accounting helps in decision making in the business arena, and it reports the financial status of the business activities. (Collier, 2005)

Accounting is a discipline of study that deals with recording, analyzing, summarizing and reporting of every form of a business deal in a very comprehensive and systematic manner which provides relevant information to its users either within or outside the organization. (Needles, 2013). Accounting follows a systematic pathway because it connects different elements in its operations in a logical system. For example, an accountant employs certain tools and techniques such as computer and computer software's to produce useful information. Accounting, which is an information system, collates and communicates economic information to all parties (managers or users) whose decision and action directly affects the performance of the organization. Accounting as a service activity provides quantitative financial information to users. This information helps them to take a decision on the proper and efficient use of resources in their business activities. (Batra,1995)

Accounting does not only deal with financial accounting. It extends its boundaries to management accounting, cost accounting, human resources accounting, depreciation accounting, tax accounting, social accounting among others. (Banerjee, 1987). The scope of accounting is wide, and it is used as a tool for even non-trading and non-profit organization.

The primary objective of accounting information to an organization is to minimize risk, uncertainties, and failures and also have a competitive advantage in the global world of business. (Nnenna, 2012) Accounting can be divided into several parts based on the activity of the organization. The most distinguishing discipline of the accounting fraternities is financial accounting, cost accounting, and management accounting.

Financial accounting is an art and science of classifying, analyzing and recording organizational or business dealings in an organized fashion in order to prepare a summary at the end of the year to ascertain the outcome of the accounting year. It aims at working out the profits or loses, assets and liabilities in the accounting year. (Drury ,2008).

Management accounting helps management in an organization to take a decision in a more efficient manner by providing them with valuable information. (Järvenpää, 2007). The only difference between management accounting and financial account is that management accounting provides managers information within an organization in

order to help make decisions whiles financial accounting aims at providing information to external parties outside the organization.

1.3 Aims of the study

The goals and objectives of accounting education are to master its philosophy. This means that apart from the learning of schema of accounting procedures, students should be able to study the social, cultural and economic transformations in the environment from the standpoint of the past, present, and the future occurrences. Accounting education should prepare students to understand and implement accounting information fully and provides the basic idea of accounting philosophy.

For this current study to be successfully investigated, the objectives must be defined. The objectives provide a sense of focus and direction. There are three main classifications of research purposes namely exploratory, descriptive and explanatory. When the purpose of the study or research is to seek new insight and understanding of the nature of the research problem, it is termed as exploratory, and when the purpose of the study is to provide a clear picture of the situation, it is termed as descriptive study. The explanatory study is a study that is used to explain the relationship between variables in a situation. (Saunders et al., 2009, p. 139-140)

The aims of this study or research are to explore the impacts of AI on management accounting students in Oulu Business School, University of Oulu. Therefore, this study is in line with an exploratory research study.

1.4 Problem Statement and questions

A study conducted by (Yu, Churyk and Chank, 2013) exposes the weakness and limitations of graduates who were unprepared during their undergraduates' studies and were faced with challenges in the use of a database, technology domain, oral

communication, and problem-solving skills. Academic institutions must begin the process of educating a generation of students with skills and knowledge. Students, on the other hand, must be willing to learn, adapt, adopt and with a strong appetite to change. We are in the era of AI and educators must, therefore, integrate and incorporate AI into a robust accounting curriculum in order to prepare and equip students with skills and knowledge. Currently, there is a high demand for graduates who are already preparing for the job market from the academic world.

The main research problem that this study seeks to provide an answer to is finding out the extent to which management accounting students have been impacted with the knowledge and skills in AI.

The above question is further divided into two main sub-questions to provide a better exposition of the questions.

➢ What are the measures put in place by faculty in impacting students with the knowledge and skills in AI?

➢ Are management accounting students willing and ready to adopt the skills and knowledge of AI?

1.5 Importance and limitations of the study

The importance of this study or thesis cannot be underestimated. The study is potentially important to management accounting students in their undergraduate studies, teachers and the whole accounting fraternity at the University of Oulu. The application of the research method to investigate the questions raised in chapter 1 will provide a foundational basis for future research work.

➢ Faculties will examine whether they have integrated AI in the accounting curriculum.

> ➤ It will also assess students whether they have acquired the requisite knowledge and skills in AI.

This will bridge the gap between classroom education and practical approach to obtaining the needed skills and knowledge in the accounting profession. The limitation of this study is Oulu School of Business. The research method adopted for this study can be improved for further studies of the subject matter. The study provides subjective interpretation, and its conclusion cannot be generalized. The approach that this study used is generally accepted and does not endanger the reliability of the work but provide benefits in its validity. The reliability of this study can be improved by triangulation. Triangulation combines different theory methods observation to investigate a study. The issues of biasness in a single method theory and a single observer of research work are overcome because of the combing effect of different theories methods, observations, empirical methods, and researchers.

The sole purpose of triangulation in qualitative is to increase the validity and credibility of the result. The reliability of this study presented data fully, openly and objectively. References to other work related to this study have been provided.

1.6 Structure of the study

The study is divided into 6 main chapters. The first chapter gives an introduction to this study. Chapter two provides us with an overview and definition of management accounting and artificial intelligence. Chapter three deals with theorizing a model for the study. In chapter four, we discussed the methodology which consists of data collection through interviews. Chapter five we presented the interview results and discussed the findings. The final chapter concluded the findings from the data collection.

2. THEORETICAL FRAMEWORK

Management accounting and artificial intelligence are broad topics with many subheadings. This chapter provides a theoretical framework of management accounting and artificial intelligence.

2.1 Management Accounting

Accountancy as a discipline has many branches. It consists of financial accounting, management accounting, auditing, and taxation. In contrast to the role of management accountants who focus on preparing accounting information for internal use, financial accountants prepare accounting information for external consumption. According to the Institute of Management Accountant (IMA, 2008) management accounting is basically defined as "Management accounting is a profession that involves partnering in management decision-making, devising planning and performance management systems, and providing expertise in financial reporting and controls to assist management in the formulation and implementation of an organization's strategy". Also, according to Drury, (1988, p20), management accounting is the process of providing appropriate information for people in an organization to assists them to make better decisions.

Management accounting information is employed by CIMA (1991, p.13) to formulate strategy, decision-making, planning and controlling activities, disclosure to shareholders or stakeholders, optimizing the use of resources. This information leads to effective strategic planning, formulating of short-term operational plans(budgeting), financial management, financial control, internal audit and communication of financial and operational information. Table 1 shows a summary of the scope of management accounting.

Table 1. Give a Summary of the scopes of management accounting. (Coombs, 2005)

Budgeting, planning, and forecasting
Calculation the profitability of product , services, and operation
Measuring organisational, divisional and departmental performance
Comparing results and performance within and between the organisation
Assisting in the process of increasing effectiveness and efficiency
Assessing the performance of past and future capital investment
Advising on decisions about product mix markets to be served and selling prices
Advising on decisions on whether to outsource products, components, activities, and services
Advising on decisions involving the investment of scarce funds between a range of possible alternatives
Assisting in the making of a wide range of strategic decisions

In recent times, the advent of technology has adjusted the role of management accountants from traditional management of scorekeeping, direct attention and problem solving to areas such as strategic problem solving and information technology. According to King et al. (1991) which states that:

`` *advances in technology - have increased the type and quantity of financial and non-financial data collection and its diffusion within organizations. The traditional*

view of management accounting as the core of an organization's information system is being challenged, and the boundaries of management accounting are being questioned. This raises the problem of how management accountants should respond. Should management accounting be concerned with primarily financial data or should it encompass the totality of the management information system? `` *(p. 294)*

and,

A powerful financial controller may initiate IT developments to extend the domain of management accounting within the organization, while a weak or inexperienced one may witness the contraction of their function as other managers develop skills

possessed by the management accountants`` (p. 295).

Table 2 shows the impacts of information technology that has caused a shift of management accountants from scorekeeping operation to strategic problem-solving.

Table 2: The impacts of information technology on management accounting (Sangster, A. 1994).

Activity	General result	Current position
Score Keeping	Labour productivity increase	Impact fragmented
	Report production increase	Variable across organization
	Report production speed increase	Variable between industries
	Information disaggregation increase	Often same as the manual system
	Enquiry response speed increase	The extra time gained by scorekeeping
		IT used to improve a score.
		keeping the facility and to cope
		with IT introduction
Attention directing	Automatic trend highlighting	No significant impact
	Automatic exception reporting	
	Release of management	
	accountant's time	
Problem Solving	Analysis	Varying use
	Report generation	Evidence suggesting a difference in
		usage related to age
		users to not always satisfied
		with the result

2.1.1 Management accounting techniques

Industries and commerce have applied management accounting for over forty years. Management accounting is an innovative and effective tool that is used for accounting data and other information to properly manage the organization or institution achieve its set objectives in the most effective and efficient way.

Management accounting techniques have been applied to institutions like schools and other non-profit organizations. The application of management accounting techniques is a useful tool for the management of resources. Techniques such as cost-benefit analysis and break-even analysis are very helpful to evaluate the benefits of activities and also it costs. Budgeting techniques is also a useful tool used for strategic planning, control, coordination, and motivation. Other techniques such as costing, managerial costing, discounted cash flow and return of capital are used to allocate resources. Evaluation techniques such as performance indicators can be used to assess how an institution like schools are performing its objectives even though it cannot give a detailed picture of the school's operation. Variance analysis is a comparative analysis between planned activities to an actual result. This information help management to act. Ratio analysis establishes the relationship between sets of figures. This help management to trace a trend in an organization. (Yau, 2004).

2.1.2 Management accountant

Management accountants also are known as managerial accountants, cost accountant, private or corporate accountant. They are the channel through which information is effectively and efficiently communicated to management. They work for public organizations, private businesses, and government agencies. Management accountants help to prepare the organizational budget and also help the organization to perform better. They also assist managers to manage their investments well. They are risk managers, planners, budgeters, strategies, and decision-makers. They help managers or board of directors make a decision. Management accountants oversee low-level accountants who perform basic accounting task in an organization such as tracking tax liabilities, recording of income and expenses and using these data to prepare cash flow statements, income statements, and balance sheets. Management accountants will analyze these data and make budgets, forecasts, plan and evaluating performance which is presented to managers to make a decision. They may also help to identify trends and opportunities for improvements, manage and analyze risk, arrange the funding and financing of operations, monitor and enforce compliance. (Fontinelle, 2017)

For managers to plan and to monitor the progress or the performance of an organization they need information. Information is provided by the management accountant to help managers. Management accountant is professionals who assist managers by providing timely and relevant information to help decision-makers or managers. Management accountant possesses business intelligence. They prepare and analyses financial statements of an organization. Also, the management accountant evaluates the financial performance of an organization. This helps management in their decision-making processes. (CPAA, 2012).

Management accountants must keep abreast themselves with the requisite skills that will move them from the usage and application of traditional number crunching and pay attention to value addition to stay relevance in an organization. According to Russel et al., (1999) management accountants must acquire strategic management decision-making abilities, so they can be value-added partners to the organization.

2.1.3 Global perspectives on management accounting education

A gap according to Fowlers English dictionary is defined as ``unfilled space``. This implies there are divergent views, development, and sympathies, etc. in management accounting education and practices. The application of management accounting started in the latter half of the 20th century. It provides timely and relevant information to decision makers or managers in order to assist them to make the best decisions in the organization. Best decisions can be evaluated in terms of its value addition to the organization in the short term. According to Friedman, (Friedman, 1970, p. 125) during the latter half of the 20th century, management accounting commentators stressed that managers should not only concentrate on the profit but to be responsible for corporate behaviour so that they can contribute holistically to the social, environmental and other problem in our society.

Tucker and Lowe (2014) reveal that the purpose of management accounting has dramatically changed over recent decades. Management accountants served as `business advisor` instead of solely narrowing on financial aspects of management accounting. Practitioners of management accounting have now moved to the provision

of information to managers in stakeholder management, sustainable business, integrated reporting (Botes, Chapman and Low, 2014).

According to Scapens (1983, p.34), there is a gap between education and practice in management accounting. He argued that the current management accounting textbooks are of limited use in practice. Ryan also further suggests that (2004) higher education has not quickly moved enough to keep abreast with the changes taking place in the global world. Kaye (2004) pointed out that few academics have kept up to date with the trend in the business environment. This raises serious concerns about the inability of educators to prepare graduates adequately for today's business environment. Also, according to Siegel and Sorensen (1999) suggest that if the academia wants to meet the needs of students and corporate customers, they must obtain a better understanding of the work performed by management accountants in modern corporations.

Tucker and Lowe (2014) also reveal that there is a big gap between management accounting practices and academia. Although, there had been a major reforms of accounting education, (Kavanagh & Drennan, 2008; Jackling & De Lange, 2009) and much literature (Albrecht and Sack, 2000; Craig and America, 2002) which has proposed it is not enough for education to help students to think and know how things are done but to prepare students on `how to do things`, that is, it should be related to work-based projects. There are many concerns about the state of management accounting education. Both individuals and group have raised their concerned, and the following quote has been expressed by the (American Accounting Association Pathways Commission, 2012) that:

"*The practice of accounting is changing rapidly. Its geographic reach is global, and technology plays an increasingly prominent role. A new generation of students has arrived who is more at home with technology and less patient with traditional teaching methods. All this is occurring while many accounting programs and requirements have remained constant, and accounting curricula have evolved with limited commitment or agreement about the core learning objectives. Vital programs, courses, and approaches require systematic attention to curriculum and pedagogy and opportunities for renewal.*"

A new breed of management accounting techniques has also emerged in our

contemporary times. Examples of such techniques Included Activity-Based Costing (ABC), economic value added, costs of reporting, Balanced scorecard, strategic management accounting. Although, these techniques are present yet there is a gap existing between management accounting education and modern-Day practice of management accounting. (Tan et al., 2004)

For management accounting education to maintain relevance, position itself within the profession and add more value to students and businesses then it must be able to meet the demand, practices, and expectations in the industry. The global market is volatile and keeps changing with the passage of time. Business is now relying on technology in its operations because of its efficiency and effectiveness. Due to the instability in the marketplace, traditional management accounting is fading away. Management accounting educators, on the other hand, are failing to redesign management accounting curricula to help equipped graduate with the requisite tools and expertise they need in a global world of business. Jacobs, (2005) provide five main principles which educators must implement in order to fill this gap. These include the ability of management accounting educators to identify the tools and techniques that are relevant to practitioners, the ability to identify the skills needed by management accountant to be practitioners, comparing the findings of the first two solutions with the results in CIMA and CA syllabi, finding the root cause of the gap and lastly making recommendations that will bring changes to education.

2.1.4 Recent changes in the roles of management accounting

Bromwich and Bhimani (1989) published an article in 1989 on management accounting with the caption ``Evolution and not Revolution``. In 1994, there was a follow-up publication titled Management accounting Pathway to Progress. These publications highlighted the need for an organization to implement strategic management accounting. They proposed that organizations needed to develop strategies which suit their internal capabilities with the available opportunity that meets their goals and objectives. Performance evaluations have been included part of strategic management to manage, clarify and communicate strategically in an organization or institution.

The future role of the management accounting function is changing tremendously. There have been a lot of studies that reveal the changes in the functionalities of management accounting. A study conducted by (Birkett, 1989) reveals that the purpose of management accounting is to provide timely, accurate and necessary information for appropriate decision to be taken. According to Barbera (1996a), management accounting function as value-adding participation in an organization process to formulate strategy, control and change. Keywords or phrases such as value adding, organizational process, strategy, and change are mostly used in defining the change in a management accounting role, business environment and the philosophies of management.

Most literature works view management accounting as advisers or internal consultant, business analyst, strategy formulator, information providers, leaders, a participator in cross-sectional team's designer and controller of the performance measurement system, designer and manager of information system, teacher, educator and interpreter and manager of complexity. According to Zerowin (1997), the future of MA will spread its tentacles to cross-functional disciplines. These include performance management, asset management, environmental management, business control management, financial management, intellectual capital management, quality management, information management, and strategic management. Factors such as the size of the organization, type of the organization and the business needs will determine the changes.

2.1.5 Skills needed by management accountant in modern times

Management accountant must acquire the needed skills to meet the changing trend in management accounting. Skills such as the ability to take leadership roles, interpersonal skills to keep promote work in cross-functional teams, tolerance of ambiguity, employee's empowerment, consultative or educative role, constructive or analytic skills to facilitate the business analyst, change agent and strategy formulator roles, ability to be intuitive, proactivity and innovativeness, synthetic and creative thinking and organizational design skills. Others include a good communicative skill (written, oral and presentation), a good team player, analytical skills, a good solid

foundation of understanding accounting, ability to understand the functionalities of business, data modelling, making forecasts and projections, developing assumptions and criteria, adaptability and not restricted to change, analyzing processes, strategic and forward-looking and risk taker.(Barbera 1996b)

According to Burns et al. (1999), globalization of markets, advances in production, increasing competition and information technologies are the most common factors changing the roles of management accountants. Thus, in an organization, MA will focus on core competencies, outsourcing, downsizing, flatter organizational structure, and teamwork, give emphasis on supplier and customer relationship. This will impact organizations on their operations, management, and business.

The integration and application of the computerized system in accounting in modern times have also caused MA to use their leisure time to learn how to analyze and interpret data (database management). Computer and information technology coupled with globalization of markets has directly affected the roles played by management accountants. The emergence of technologies and the completeness of the global market have made organizations focus more on customer relationship, quality services and products. Organizations have been forced to compete more on quality, price, speed of delivery and customer service. Therefore, management accountants must always be ready to provide information's to all sectors of the organizations with measures and performance indicators. Should management accountants failed to provide managers with timely information will render them redundant at the organization. (Binnersly, 1997).

A study conducted by (Malmi, Seppala and Rantanen, 2000) with the caption`` *The Practice of Management Accounting in Finland- A change?* Reveals some revelations in management accounting. The survey gathered information from 300 respondents of management accounting practitioners on the most common traditional management accounting activities, the work activities that were important and the skills that are important and are required from management accountants. The study reveals that financial reporting and budgeting are the most common tradit6tional management accounting practices which are likely to change in the future. The study further reveals the skills that management accountants need in modern times in accounting. Table 3 provides evidence that management accountants must pose the skills in analytical and

problem-solving skills and the ability to understand the implications of day-to-day decisions on the bottom line.

Table 3. The most needed skills needed by management accountants. (Malmi, Seppala, Rantanen, 2002)

	ALL			MA
Skills and abilities	N	Means	N	Mean
Analytical and problem-solving skills	297	4.71	112	4.74
Ability to understand the implication of the day-to-day decision	300	4.58	112	4.63
on the bottom line				
Ability to understand relevant costs in decision making	299	4.33	112	4.38
Oral and written communication skills	300	4.18	112	4.21
Understanding cost behaviour	300	4.17	112	4.28
Understanding business processes and competition	297	4.1	111	4.1
Interpersonal skills	299	4.1	112	4.13
Understanding the meaning of internal co-operation between function	296	4.06	111	4.19
Understanding the information needs of int. and external customer	296	4.01	112	4.03
Work ethics	299	3.99	112	3.97
Negotiation skills	300	3.89	112	3.92
understanding the cost - volume - profit analysis	299	3.87	112	4.02
Leadership and management skills	299	3.86	112	3.98
*Variable costing skills	299	3.8	112	4.01
Ability to plan and develop information systems	298	3.73	112	3.86

Understanding value and non-value added cost	296	3.71	112	3.8
Understanding the time value of money	298	3.6	112	3.68
Understanding the matching of direct and indirect costs	298	3.56	112	3.67
Benchmarking skills	298	3.52	111	3.66
Understanding non-financial measurement	299	3.45	112	3.47
Knowledge of customers and markets	299	3.43	112	3.53
Ability to understand and prepare decision-making models	296	3.44	112	3.45
Understanding of behavioural and motivational effects of budgeting	300	3.4	112	3.54
*Ability to optimise the inventory levels	290	3.34	107	3.52
*Just - in - time understanding	291	3.27	107	3.48
*Inventory valuation skills	298	3.19	111	3.37
Ability to draw up process maps	297	3.15	112	3.24
Target costing skills	297	3.11	112	3.24
*Standard costing skills	296	3.97	111	3.14

2.2 Artificial Intelligence

Human beings, animals and nonhuman beings all possess some level of intelligence. Intelligence exhibited by machines is known as artificial intelligence. John McCarthy presented a comprehensive definition of artificial intelligence in 1956. According to McCarthy, AI is the science and engineering of making machines intelligent, thus making intelligent computer programs. AI is a way of making a computer or robot or computer software think intelligent like how human beings think intelligently. AI can be accomplished by studying how the human brain work, learn, decide, think to solve a problem. The outcome of the study is used to build intelligent computer software and system. (Amelia and Carole, 2006)

AI is a subfield of computer science which uses an intelligent system. There are many branches of AI. Some of these include machine learning, expert system, etc. Machine learning is a computer system that has the ability to learn from past experiences. It uses algorithms to interpret data and predicts its outcomes. (Russell & Norvig, 2003).

2.2.1 Overview of Artificial Intelligence

Artificial Intelligence is shaping and modifying the practices of the business world and the accounting fraternity. The ability of AI to learn, think and react like humans does possess as a potential tool that can be used to revolutionize the trend in the accounting department. Many professionals in the accounting world must up their game with the requisite training in order to fit well in the marketplace of work because AI is a good business enhancer. The accounting professionals need the right technical mind and skills that will act with precision to help in decision making. AI is used in auditing, financial, and management accounting. It is expected to penetrate all sectors of the accounting fraternity and will increasing takeover the routine tasks formerly performed by accountants. AI is adopted in most organization due to its operational efficiencies and cost savings. (Dilek, Çakır and Aydın, 2015)

In modern times, AI has undergone significant improvement, especially in the accounting professions. The application of AI to accounting has a long history. AI has been implemented for accounting areas such as auditing and financial reporting about 25 years ago. According to Yudkowsky (2006), the greatest threat of AI is that people usually assumed too early to have a better understanding of the AI system. The emergence and revolution of AI in most accounting professions have generated a lot of fear, worried and concern among accountants as it is seen as a tool that will make most accountants redundant in organization soon. A study conducted by the University of Oxford in 2015 reveals that 95 per cent of accountants will lose their jobs as AI takes over the role of data analysis and number crunching. (Griffin, 2016). Also, the study reveals that, as the technology of AI is improved, some jobs will be eliminated while others will be created. (Greenman, 2017). This suggests that AI will reduce the

rigorous, repetitive and tedious nature of the accounting profession and increase its efficiency as a consultative tool.

AI technology is resolving most of the difficulties in computer science. The basic objective of ai is to seek to address complex tasks executed by humans using computers that have the ability to use features of human intelligence. The designing of this technology is due to its versatility, velocity, veracity, and connectivity. AI is permeating in all technologies and impacting the way business is done nowadays. Both large organizations and small and medium scale enterprises (SME`s) are implementing AI. Reports from financial stability board show that the application of ai in both public and private organizations. AI is used in these sectors for evaluation off data quality, regulatory compliance, surveillance, fraud detection, etc. (FSB, 2017). AI is efficient in accounting systems because it has the power of applying the methods of self-diagnosis, self-management, self-configuration, self-healing, and self-tuning. Studies have also shown that the development of computer software and the modern-day tool of ai has significantly improved the performance of accounting in terms of speed and accuracy, reduce the usage of paper, increased flexibility, and efficiency improved internal and external reporting and database management system. (Francis, 2017)

2.2.2 A short history of Artificial Intelligence

The idea of AI was birthed as early as the 17th century by Thomas Hobbes who proposed that the behavior or cleverness of human beings could be exhibited in mechanical terms and symbols in terms of numbers, calculations, graph and statistics which could be harnessed to solve problems. In the year 1955, shortly after the Second World War, McCarthy, Rochester, Minsky, and Shannon came out with the first project on AI. The main aim of the project was to promote machines that apply language in terms of concepts and abstraction to tackle problems and to enhance itself. In subsequent years, scientists have been using a different approach to build AI, but due to technological limitation, it couldn't yield a potential breakthrough. In (Drefus ,1965) divided the application of AI into four main areas which are game playing, language learning and translation, the realization of pattern and problem-solving. In recent times, there is a fast-growing and high demand for AI in every aspect of

organization and industries. (Amelia, 2006)

2.2.3 Goals of artificial intelligence

The source of motivation and inspiration for AI is the brain. AI is said to be achieved by studying how the human brain thinks or function and how humans by nature learn, decide and work to solve problems. It is out of these characteristics that led to the development of intelligent systems and software's to mimic this behavior.

The goals or objectives of AI can be categorized into two. To create an expert system. A system that emulates the intelligent behavior explain, demonstrate and advise its users and to implement human intelligent in computers or machines which will have the ability to think, understand, learn and acts like humans.

2.2.4 Relevance of AI to Accounting domain

The applications of AI to the accounting domain can be seen in a wide range of institutions and organizations. Experts system which is a subset of artificial intelligence have been developed for public accounting and consulting firms, commercial developers, corporate developers, federal and local governments.

There are many areas in accounting that AI is applied. The most outstanding use of AI involves the rule-based expert system. There are other non-ruled based systems and neural networks. The role of accounting and accountants is to be service providers of information for their clients. Expertise from accounting professionals forms an opinion about complex information from numbers and symbols (Borthick, 1987). According to McCarthy and Outslay (1989), the teaching of AI should focus on the process of problem-solving (heuristic) as opposed to algorithmic. The knowledge representation is in the form of symbol contrary to that of numbers.

Expert system is developed for external auditing that is used in public organization to plan auditing, risk assessment, determine disclosure compliance, evaluate loan loss

reserves, predict bank failure, recommend audit sample size account for foreign currency transition, evaluate internal control and application of SEC regulations.

In taxation, expert systems are developed and applied in institutional and individual tax planning, tax-exempt status maintenance, uniform capitalization, compliance checking, tax issues concerning preferred shares and resident alien status questions. (Brown, 1991)

In financial accounting, the expert system is developed and use in most firms to provide personal financial planning to individual customers. Neural network developed by Shearson Lehmans is used to predict stock and bond performance. Some expert systems are also used to assess a loan application.

In management accounting, an expert system is developed and applied to provide personal financial planning assistance to their employees. There is another developed expert system in MA used to authorize customer purchase, assist its field representatives in pricing bids, assist employee's capital budget requests. The neural network also identifies Spiegel's most likely consumers. (Phillip et al., 1990).

3. THEORETICAL MODEL FOR ANALYSIS

There are few publications o that can be used to examine the relationship between AI, management accounting and educators or institutions. Both AI and management accounting are a broad subject, and the presence of more than one existing model may provide vital information for the analyses of this study.

3.1 Socio-technical perspectives

A study conducted by Badwin-Morgan (1995) proposed a socio-technical model that seeks to address some relevant issues in AI implementation. The model stresses on the impacts of AI into accounting curriculum which includes the recognition of faculty to integrate AI, the expertise in faculty with the knowledge of AI, the motivation (external and internal) in incorporating AI into accounting curriculum and the knowledge gained by students in AI skills. Figure 1 provided the four main steps which the model adopted in the integration of AI into the accounting curriculum
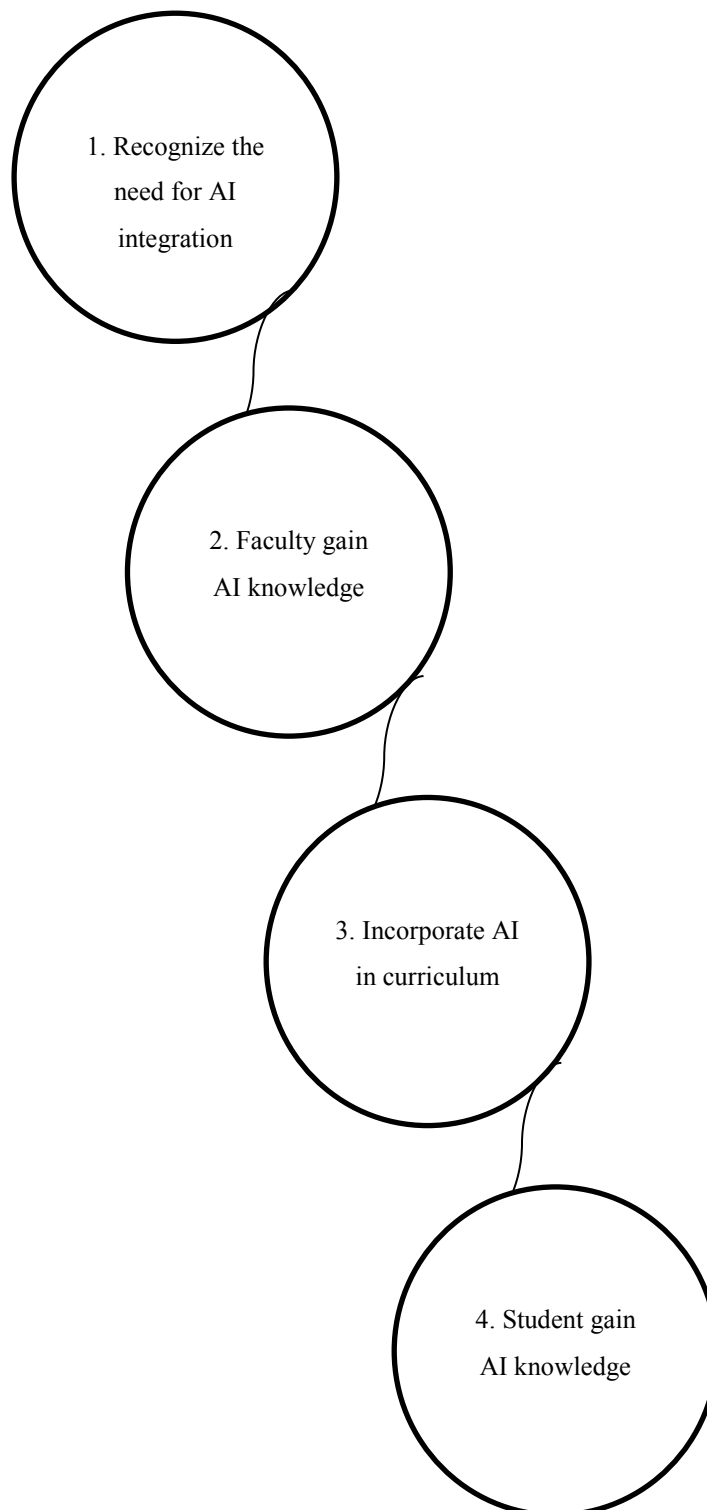
Figure 1: Steps to integrate AI into the accounting curriculum. (Baldwin-Morgan,2006)

The model also provided a technical dimension where students and professionals advocated for a change in the curriculum which allows the using and building of an expert system to solve a problem in their field. For instance, in management accounting, King and McAuley (1991) have developed an expert system that supports the learning process in management accounting. The knowledge back system covered and discussed extensively on standard costing.

In Financial Accounting, Boer and Livnet (1990) have also demonstrated how to use expert system project to educate intermediate accounting students on how to classify capital. The students were dividing into two. One of the groups used Exsys expert system whiles the other groups used the traditional textbook method. It was found that the groups that use the expert system had fewer errors as compared to the other groups of students.

In taxation, French and Flesher (1987), argued that tax educators must be able to impact students with the requisite knowledge on the expert system on taxation. There had been few reports that touch about the expert system. Also, Bouman and Knox-Quinn had supervised master's students who were developing expert systems on taxation. The students have good knowledge about taxation but have also developed problem-solving skills.

Auditing is one of the branches of accounting that have developed a lot of expert system is the auditing departments although there is not enough coverage on auditing courses. This means that more courses on auditing related task and evaluation of internal control must be introduced to students

According to a published journal by Black and Constanti (1988), an expert system on accounting should be given a high premium for accounting students class. White (1995) also analyzes the need for expert system and AI to be introduced in accounting education courses. Eining and Dorr have also developed an expert system used for internal control evaluation. Students have used this system in accounting information system courses. The model finally suggested that the integration and implementation of AI will request applied computerization, support from external and internal players, institutional structures and the interaction among these components.

3.2 Organizational innovations

The integration and application of AI are viewed as technological innovation. Organizational innovation models have to do with appropriately the studies of the relationship between AI, management accountants, and organization. There are three main stages of organizational innovation proposed by Kwon and Zmud (1987) namely the initiation stage, adoption stage and implementation stage. Initiation stage comes as a result of pressure to change whiles the adoption stage involves the provision of resources. The last stage which is the implementation stage is the process of developing, installing and maintaining operational activities. Implementation stage can also be viewed as a stage for acceptance, application, performance, satisfaction and integration or incorporation. These models address specific technical, political, motivational issues and provide the basis for the integration of several associated constants.

According to The Association of Advance Collegiate School of Business (AACSB), a global accreditation for accounting business has stated its mission with the caption:

``*Consistent with mission, expected outcomes and supporting strategies, accounting degree programs should include learning experiences that develop skills and knowledge related to the integration of IT in accounting and business. Included in these learning experiences is the development of skills and knowledge related to data creation, data sharing, data analytics, data mining, data reporting and storage within and across organizations. Accounting degree programs should integrate current and business information technologies throughout the academic Curriculum. Learning experiences may be supported by business accounting and other academic units.* ``
(Krahel & Vasarhelyi, 2014)

There are good models that provide evidence of the difficulties in changing a school's curriculum to meet current situations and how these challenges can be resolved. Changing of schools Curriculum is a very difficult thing to do, and it does not happen overnight especially in the areas of integration microcomputers. King and Whittaker (1991) provide a model that examine the unwillingness of some educators to change their Curriculum. One of the ways by which the knowledge of AI can be made known and relevant to the academic world is by disseminating of useful information about AI

and providing practical examples of its successful usage in the business world.

According to (Luo, Meng & Cai, 2018) college students are the main force of the accounting discipline in the future. The training program in most universities fails to make the needed adjustment in the context of accounting reform. There are courses that fail to relate AI to management accounting, pay less attention to the innovation of accounting concepts. This has created a big gap in the industry where there are high demand and short supply of competence graduate who has the requisite skills and technical know-how to meet the demand of our time and the future.

The model stresses that universities and colleges must arrange courses and programs which reasonably and scientifically meet the criteria of their teaching goals and objectives. There must be an effort of attaching great importance of combining theoretical knowledge and the practical application of accounting, strengthen cooperation between universities and the business enterprises. In addition to these, universities must also strive to create practical opportunities to enable students to get the practical ability and *cultivate applied accountants*. The universities communities must help teachers to improve the quality of their teaching constantly. Teachers must protect abreast themselves with the current trend in the International financial standards in the accounting domain. This will help teachers to make accounting classroom and practical teaching meet the trend as time goes by. It is only when teachers strive to improve their teaching skills that will produce readily made accounting students that meet the global markets of work. The educational sector plays a vital role in the impactation of these skills and knowledge. Hartherly and Fraser (1991) advised accounting students must be familiar with AI because it is being used in their professional field.

3.3 Information technology implementation

There is a lot of research work that examines the factors that relate to the adoption, development, and implementation of information technology. Krishna et al. (2012) proposed a model for the implementation of an information system. The model provided an insightful revelation of the impacts of information technology in

management accounting. These include lack of awareness creation and understanding of current technology that shapes management accounting, the impact of IT on management accounting that influences the nature of the business, management directions and a chosen technology. The model claim by adopting a correct system and technology in management accounting, organizations and accountants will be able to deliver accurate reports that will make a better decision and investments. Also, the integration and application of IT in management accounting will address the needs of business analysis and evaluate performance. The model finally concluded that management accounting needs technology to enhance and improve its functionalities because that is what managers are looking for to deliver the demand that traditional management accounting has failed to address.

A conference report from Seethamraju (2010) stated that for management accounting education to regain its relevancy in the 21st century and beyond, there must be continuous changes and improvements in the academic courses. The learning process must abreast with technological innovations that professionals' accountants are currently practicing in an organization. New skills must be acquired in terms of information and information systems. According to accounting school's information technology is one of the technological skills that accounting graduates must possess. He further proposed that accounting schools must incorporate frameworks such as REA, concept which includes IT controls, network security, accounting forensic and accounting software or applications such as business intelligence, SAP, MYOB, and strategic enterprise management into their curriculum in order to equip and prepare accounting graduates for the future

.

4. METHODOLOGICAL APPROACHES

Theoretical discussions of this study apply conceptual and constructive research methods. The purpose of using these methods is to be able to theorize and develop new conceptual frameworks, which will then be tested at practice. Equally, one can see that constructive theoretical discussion is used for creating practical new models or constructions for questionnaire development purposes, partially using old and already presented reasonings. Overall, the purpose of the theoretical discussion is to be able to create qualitative understanding for real-life observation purposes.

4.1 Research design

A study can adopt either a quantitative, qualitative or both method approach. Quantitative research methods are used to analyze research questions requiring numerical data. In this analysis, the information collected is quantified and exposed to statistical analysis in order to contradict or support alternative research claims. (Creswell, 2003). Qualitative method or approach is used to investigate and better understand things in their natural settings, trying to make sense out of experiences or interpret occurrences in terms of the meaning people bring to them (William, 2007)

 Qualitative research or method is an exploratory method which seeks to gain a proper perspective or understanding underlying opinions, reasons and motivations. It provides in-depth knowledge into the problem at stake or helps to develop hypotheses or ideas for potential quantitative research. Practical discussions of this study follow the qualitative research method.

4.1.1 Interview

During the qualitative study, eight expertise were contacted for the interview regarding the impact of AI on management accounting. The duration for the interview span between 7 to 35 minutes depending on the respondents and the available time as shown

in table 4 and 5 respectively. The questionnaire for the interviews can be seen in Appendice1.

4.1.2 Population of the study

As mentioned above, the population consists of lecturers and students at Oulu School of Business, University of Oulu. The respondents stated remain anonymous in order to protect the confidentiality of their information. Therefore, `L` stands for lecturers and `S` stands for students as shown in table 4 and 5 respectively.

4.1.3 Area of study

The study was carried out at the University of Oulu business school. Oulu business school is an accredited school from the Association to Advance Collegiate Schools of Business, (AACSB) an international accreditation body for research and education. AACSB is established for economies sciences. Oulu Business School OBS is one of the eight faculties at the University of Oulu and the second largest multidisciplinary universities in Finland. It has about 1450 students and 100 faculty and staff members. It is responsible for the provision of business education in the whole of Northern Finland.

4.1.4 Choice for the selection of respondents

Eight experts in accounting and management accounting were interviewed. Five of the eight experts were second-year undergraduate students pursuing a master's degree in management accounting, and three of the experts are faculty heads, professionals and senior lecturers of accounting. These experts were selected for the research purpose because they met the criteria for the established study. These experts are senior lecturers, academicians, and professionals in the accounting and management accounting professions which met Harmon and King (1985) criteria for an expert who have understanding in theoretical and more than ten years in practical experience. The years of experience of the academic professors vary between 13-25 years whiles the

studying experience of the students varies between 5-6 years. The experts were pre-informed, and the research study explained to them. The interviews were arranged at a location stipulated by the interviewees. The purpose is to reduce distraction. The interview was stopped when it was felt by the interviewer that no more information is needed.

Table 4. Description of respondents (Faculty members)

Respondents	Years of experience	How	Duration (min)
L1	22	in person	10
L2	13	in person	15
L3	25	in person	24

Table 5. Description of respondents (students)

Respondents	School level	Position	How	Duration
S1	Second Year	Student	in person	00:07:19
S2	Second Year	Student	in person	00:05:02
S3	Second Year	Student	in person	00:42:49
S4	Second Year	Student	in person	00:13:36
S5	Second Year	Student	in person	00:18:57

4.2 Data collection

4.2.1 semi-structured interview

A semi-structured questionnaire was designed and used as a tool for the collection of data. Patton (1990) proposed three identifiable features for qualitative interviews.

These are informal conversational interviews, standardized open-ended interviews and guided interviews. Although these three types of qualitative interviews differ in terms of the form and structure of the questionnaires, the responses to all the interviews fall within the umbrella of an open-ended and unrestricted to the choices supplied by the interviewer. The captured data obtained from the interviews were both audios taped recorded and traditional note-taking. The respondents were professional in the accounting profession with high experience and exposure in my field of study and occupy a respectable position such head of department, dean of students, senior lecturers, and students at the University of Oulu.

The average time taken for the interview lasted between 10-20 minutes. The interviewees were contacted, and scheduled date and time were confirmed. The interviews were conducted in a serene environment void of distractions and obstructions for proper reception during audio recording. A face to face interviews was adopted because it provides a greater degree of flexibility as compared to other means of interview techniques. Face to face approach was chosen for this study due to the complexity of the questions, sensitivity of the subject matter and the duration for the interview. The respondents or interviewees were pre-informed as to the purpose of the interviews which help them to prepare adequately and to offer quick responses to the questions. Respondents were also given the opportunity to propose new ideas that could be of help to the problems at stake during the interview. The responses from the interview were codified, drafted and confirmed for proper analysis.

5. RESULTS AND DISCUSSION

In management accountancy, case study research often takes place in an institution or organizational context. It draws its inspiration from a sociological perspective (Scapens, 1990). Some case studies may also be taken the theory of economics. This case study usually implies a single unit such as a company. The advantage of this is that it paints a picture of the situation. The limitation of this case study is that it does not give a general view of the theory. This study investigates the impact of AI on management accountant. The following results are the summary of respondents from faculty members and students at the Oulu Business School (OBS), University of Oulu. This chapter provides a description of the results. In addition to this, we presented the results obtained from the structured interviews that were conducted.

5.1 Presentations of interview result from Faculty members

1. Interview of L1

L1 is an accounting professor with 22 years' experience in teaching management accounting and other accounting disciplines. This makes him an expert for the interview with the requisite knowledge on what is going in the faculty and the world as far as the subject of AI and management accounting is concerned. The time session for his interview lasted approximately 7 minutes as shown in table 4. He was straight to the point and provided all the information needed for analysis. His analysis begins with familiarization with AI and management accounting and what is going on in the faculty in his first protocol.

Protocol 1: ``*There is an integration of AI into accounting curriculum in the faculty*.``

Protocol 2: ``*We have a course known as Accounting Information Technology (AIT). This course talks a little bit about AI and reflects the role of management accountants*``.

The interview allows the respondents to think aloud as they were presented with research questions. It was a question that was in line with what is going on the

academic arena as far as impartation of skills and knowledge of AI to students.

He stated that faculties have a good textbook but treat AI and management accounting separately.

Protocol 3: ``*We have good textbooks, but a combination of AI and management accounting is insufficient because it is a new concept*``.

He continued to say that there is ongoing research by students on the role changes in management accounting. He stresses the fact that the faculty has the expertise to teach AI but not enough. He finally concluded that AI would not entirely replace the need for a management accountant, but management accountants need to prepare for it by acquiring some skills.

2. Interview of L2

L2 provides an insight into the study. L2 is an academic professor who has taught management accounting and other accounting disciplines for 13 years. This makes him a suitable candidate as an expert for the interview. The time interval for his interview was approximately 17 minutes in table 4. He was able to provide all the information needed for the analysis. His analysis begins with familiarization with AI and management accounting and what is going on currently in the faculty. L2 reveals that faculty have recognized the need for AI integration into accounting discipline.

Protocol 4: ``*There are related courses of AI and management accounting but not enough*``.

L2 also reveals that he is not aware whether faculties have the expertise to teach AI in management accounting.

Protocol 5: ``*we do have some experts who come to teach AI, but I don't know whether the faculties have the personnel for that*``.

L2 claim he has not seen seminar being organized for students on AI. He further stated that there are other research topic going on that are related to AI in the faculty. L2 shares the same sentiment with L1 that there are good textbooks that treat AI and management accounting separately. L2 finally concluded that AI would not take away

all the roles of management accountant in the future, but most of the roles such as bookkeeping, forecasting, and other work has been taken by AI. He still believes AI is in the developmental stage even though its application and integration is huge in the industries and organization

Protocol 6: ``*I think AI is still in the developmental stage.* ``

3. Interview of L3

L3 is an accounting professor who has taught management accounting and other accounting disciplines for 25 years. This makes him a suitable candidate as an expert for the interview. The time interval for his interview was about 11 minutes, and he was able to provide all the information needed for the analysis in table 4. His analysis begins with familiarization with AI and management accounting and the current state of the faculty in integration AI into accounting discipline. L3 assessment confirms what L1 and L2 said. L3 confirms that faculty have recognized the need and have integrated AI into accounting discipline.

Protocol 7: ``*There are courses in the curriculum that relates AI into accounting but are treated separately.* ``

L3 claims that faculties have the expertise for the teaching of AI to accounting students. He also confirms that there is a good textbook for both AI and accounting but insufficient textbook that combines AI and management accounting. L3 further stated that seminars are organized for master's students on AI to create awareness. There are other research going on in the faculties by students on AI.

L3 concluded that AI would not replace the need for management accountants, but some roles have been taken by AI

Protocol 8: ``*AI will not totally replace the need of management accountant, but some roles will change*``.

5.2 Presentation of interview result from students

1. interview of S1

S1 is an undergraduate second-year master student at the Oulu Business School (OBS), University of Oulu. He has studied management accounting and other accounting disciplines for about six years. This makes him a suitable expert for the interview as a student. S1 began with familiarization of AI. He asserted that he became aware of AI through the internet. S1 used approximately 7 minutes for the interview as shown in table 5. He claimed AI would take over most of the jobs in the future. S1 defined AI as:

Protocol 9: ``*a machine that has the ability to simulate human intelligence with the computer program.* ``

S1 claim he had not attended any seminar on AI.

Protocol 10: ``*I have not attended any seminar because it is not priority*``.

S1 also claims he has not taken any course related to AI.

Protocol 11: ``*I have not taken any course in AI but seems interesting to me*``.

He also stresses the fact that AI can be a better tool than humans. S1 has no knowledge of database management.

Protocol 12: ``*I am not familiar with that*``.

S1 finally concluded that the role of the management accountant will still be relevant. Management accountant and machine will work together.

Protocol 13: ``*I don't think the work of management accountant will completely be redundant. There will be a collaboration between human knowledge and machine*``.

2. Interview of S2

S2 is an undergraduate second-year master student at the Oulu Business School (OBS), University of Oulu. He has studied management accounting and other accounting disciplines for about six years. This makes him a suitable expert for the interview as a student. S2 began with the familiarization of AI. He became aware of the emergence

of AI through course studies and the internet. S1 used approximately 43 minutes for the interview as shown in table 5. According to S2 AI is defined as:

Protocol 14: ``*a machine learning to mimic human behavior and works based on a program instruction to perform a task*``.

S2 was passionate about AI and took a keen interest to watch a seminar via online to know what is going on in accounting discipline with regards to AI. S2 also took a compulsory course in AI in accounting. S2 claim he has basic knowledge in database management through work experience and studies. S2 asserted that AI would provide better and accurate information to management than a human being. S2 believes the work of management accountant will not be redundant, but some roles of management accountant will be taken.

Protocol 15: ``*AI does not have the psychology and social value as compared to their human counterpart*``.

3. Interview of S3

S3 is an undergraduate second-year master student at the Oulu Business School (OBS), University of Oulu. He has studied management accounting and other accounting disciplines for about six years. This makes him a suitable expert for the interview as a student. S3 became familiar with AI through courses studies and the internet. S1 used approximately 5 minutes for the interview as shown in table 5, S3 gave an elaborate definition of AI as:

Protocol 16: ``*a smart computer program or software which tries to copy human ideas to make things.*``

S3 claim he had not had any courses in AI. The reason being that he had no personal interest in AI.

Protocol 17: ``*I have no personal interest in AI*``.

S3 does not have any knowledege on database management. He believes AI can offer better information to management.

Protocol 18: ``*I think AI will provide better information in the future, but it will take some time*``.

S3 finally stated that the work of management accountant will not be redundant because ideas of management accountant are Still needed to build of help AI.

4. Interview of S4

S4 is an undergraduate second-year master student at the Oulu Business School (OBS), University of Oulu. He has studied management accounting and other accounting disciplines for about six years. This makes him a suitable expert for the interview as a student. S1 used approximately 14 minutes for the interview as shown in table 5 S4 became aware of AI through a friend. He defined AI as

Protocol 19: ``*something that provides accurate result and makes work easier*``.

S4 attended a seminar on AI. It was a seminar on Accounting Information Technology. This confirms the assessment of L3

Protocol 20: ``*I attended the seminar because it was related to accounting*``.

S4 also took a course in AI for a personal interest.'

Protocol 21: ``*I took the course in AI for my personal interest*``.

S4 have knowledge of database management through a course she read at the University. S4 believes management accountant role will not be redundant. AI needs the expertise of management accountant. Also, for AI to function properly, it needs monitoring.

Protocol 22: ``*No, it will not be redundant*``.

S4 finally concluded that AI can provide better information to management than management accountant.

5. Interview of S5

S5 became aware of AI through global trend, academic research, courses offered at the business school and through practical life. S1 used approximately 19 minutes for the

interview as shown in table 5, S5 defined as:

Protocol 23: ``*a machine and a business tool that minimises the risk of depending on human capabilities such as thinking, creativity, learning, and development.*

S5 had not attended any seminar because it is not his priority.

Protocol 24: ``*I am aware of the current trend of AI, but it is not my priority*``.

S5 reveals that he got some knowledge about database management studies, Oracle, massive ERP system. S5 had a mandatory course related to AI.

Protocol 25: ``*I took a course because I want to be exposed to the practical life of accounting and AI*``. S5 believes AI will make management accountant because it is taking the work of all professionals including management accountant.

Protocol 26: ``*I will not be surprised to see a machine working as an accountant in the future*``.

S5 has a mixed reaction on whether AI can provide better information. He argues that

Protocol 27: ``*AI can only provide better information if we are able to provide good data.*``

Protocol 28: ``*AI must be monitored by management accountant, so it does not create problem in the future*``.

Artificial intelligence continues to threaten the survival of the accounting profession. It is disrupting the accounting professionals with many years of education and experience. Generally, people and organizations tend to oppose or resist changes because of the comfort they have with the way they do old things. The reality on the ground is that the future of technologies is for those who prepare for it and are willing to pay the price by acquiring the needed skills and knowledge. Preparation comes as a result of acquiring the right knowledge and skills for the future. This will help individuals, organization or institution to stay relevance in the development of times and also have a competitive edge over their competitors in this 21st century and beyond.

The semi-structured interview from this study has identified and gained insights into the impacts of artificial intelligence in management accounting students and the measures put in place by the faculty. Analysis from faculty also revealed that faculty had recognized the need for AI. A study conducted by Cable et al (2007) which states that accounting programs that were offered in academic institutions must be refined to bridge the gap between academic study in accounting and a career in professional practice, aiming to deliver work-ready graduates who will assist in meeting the needs of employer and help reduce the skill shortage in the accounting profession.

Analysis from faculty revealed that there is an integration of AI into the accounting curriculum. According to Baldwim-Morgan (2006), there must be adequate motivation for the integration of AI into management accounting education from external and internal influencers from the academic world. According to King and Whittaker (1991) changing of school's curriculum is a very difficult thing to do and it does not happen overnight especially in the areas of integration microcomputers. They also examine the reluctant ness of some educators to change their curriculum. They provided solutions that one of the ways by which the knowledge of AI can be made known and relevant to the academic world is by dissemination of useful information about AI and providing practical examples of its successful usage in the business world.

Analysis from faculty shows that faculty have good textbooks that integrate AI into Accounting but insufficient books that combine AI with management accounting. According to (Yap, Ryan, and Yong, 2014) there must be changes in accounting education so as to fulfil the requirements of business organizations, help prepare students for markets requests and to survive in a changing environment. In our contemporary times, business organizations require professionals who have acquired new skills that are in line with the demands in our time. It is the responsibilities of academia to be aware beforehand and to prepare their students with adequate training. Badwin-Morgan (2006) have suggested other instructional books that served as supplementary books AI coverage in accounting such as Brown and O`Leary (1994).

Analysis from faculty shows that there have been awareness and motivation by faculty through seminars. According to a survey conducted by Hatherly (1988), that accounting students must familiarize themselves with an expert system skill, because it is much required in the accounting profession.

Analysis from faculty shows that there is insufficient expertise to impact students with the knowledge and skills in AI. According to Luo, Meng, and Cai, (2018), the universities communities must help teachers to improve the quality of their teaching constantly. Teachers must abreast themselves with the current trend in the international financial standards in the accounting domain. This will help teachers to make accounting classroom and practical teaching meet the trend as time goes by. It is only when teachers strive to improve their teaching skills that will produce readily made accounting students that meet the global markets of work.

Analysis from students indicates that the majority are willing and ready to adopt skills in AI. The minority of the students are reluctant to adopt the knowledge and skills in AI. Most of the students are aware of the AI through seminars, journals, and the media. Also, the study reveals that majority of the students have taken AI-related courses in their undergraduate studies. According to Parham et al., students must examine skills that will be beneficial to them in the future. Students must acquire a good communicative skill (written and oral), decision making, motivation, financial analyst and professional judgement. Also, according to the analysis of students, majority of the students have acquired basic knowledge in database management. Many accounting organizations are looking for a management accountant who are confident in the use of technology, innovative and creative and open-minded. They must also possess the skills known to use technology to work with the available data.

6. CONCLUSIONS

There have been several warnings to management accounting education globally which needs to be addressed in order for the profession to stay relevance, maintain its positions and add values to students and business organization. Management accounting is an innovative tool employed by managers for the management of resources in an organization. It plays a vital role by providing vital information required for management decisions. Artificial intelligence which is the biggest invention is changing the course of the event in our civilized world. AI is causing technological transformation in life and organizations. AI is surreptitiously taking over most of the activities formerly operated by the accountant. It is expected to take over the roles of management accountant increasingly. AI has been tried, tested and proven to be a tool that is impacting lives and making life much easier than it used to be some decades ago. The economic impact of AI will be tremendous and will provide many opportunities for countries and business that are ready to exploit its potentials.

Even though AI is promising now and the future, most students and organizations are oblivious to adopt the skills and knowledge that it demands. From the researcher's experience, there is the need to assess the impact of AI on undergraduate management accounting students in Oulu Business School (OBS), University of Oulu. Therefore, the purpose of this study is to explore the impact of AI on management accounting students in the acquisition of skills and knowledge.

This present study takes a contemporary issue on the integration of AI in management accounting which tries to look at the universal questions raised by investigators or researchers. The two fundamental questions addressed in this study has to do with whether students are ready to adopt the new breed of knowledge and skills to meet the demand for AI. The second question has to do with the measures put in place by faculty in the impactation of skills and knowledge in AI to prepare students for the future. This is the research problem addressed by this study.

The information from this study will help the researcher to design a model for the integration of AI in management accounting model for schools and the business world. The study will assess whether students have the requisite skills and knowledge to meet

the present-day challenges in the global world. In this study, the primary empirical source was an interview conducted on faculty members and management accounting students to verify the primary source of input.

What are the measures put in place by faculty in impacting students with the knowledge and skills in AI?

According to the first question raised above for this study, the findings indicate that faculty have integrated AI into the accounting curriculum, there are good textbooks for AI and accounting but lack of textbook that combines AI and management accounting, AI awareness has been made known to students through seminars and AI related courses (AIT), availability of expertise to teach and impacts students with knowledge and skills in AI. The summary of the information provided by faculty shows that the faculty is playing a good role in the impactation of AI skills and knowledge. However, from the information gathered some areas such as more seminars must be organized to sensitize students, more teachers must be helped to acquire the expertise in AI and textbooks that combines AI and management accounting should be improved.

Are Management accounting students ready and prepared to adopt the skills and knowledge of AI?

From the second question raised above for the study, the findings from the students show that majority of the students are aware of AI through seminars, AI-related courses in accounting, journal articles and the internet. This shows that the students are aware of the trend and the impacts of AI in the global world. The study further indicated that the majority of the students are willing to learn and adopt AI skills and knowledge. The minority are oblivious to learn and adopt skills and knowledge in AI. Majority of the students have also taken AI related courses in accounting. Also, the majority of the students do not have knowledge in database management. This problem should be addressed in order to equip students fully. The findings also reveal that most of the students have attended seminars on AI at the faculty. This shows that the students are willing to know more about AI and its impacts in the accounting discipline. The study also shows that most students have acquired the basic skills in

database management.

The findings from this study support the views of (Bandy, 1990) which states that `` *the main purposes of accounting education should not only be the teaching of accounting to students but also teaching students with the requisite knowledge to become accountants*``. This study will go a long way to contribute to the dearth of literature on the integration of AI in management accounting education and other disciplines. It would also serve as a model that could be used by other universities to assess the measures put in place by faculty in the integration of AI in their curriculum. The limitation of this study is to Oulu School of Business, University of Oulu. The methodology used for this study can be improved or adopted for other studies. Future research can be conducted using a different method or approach to support or refute this claim. Accounting education should research more on the impactation of AI skills on students. Also, the academic institutions must prepare well with all the requisite resources to help students prepare well enough in AI technology because it is the future of their professions.

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APPENDICES

Appendix 1: Questionnaire

QUESTIONNAIRE

QUESTIONNAIRE FOR FACULTY MEMBERS

Dear respondent,

I am Deborah kwafo second year student of University of oulu studying at Oulu business school. I am carrying out research on the Topic "Qualitative Assessments of The Impacts of Artificial Intelligence on Management Accounting Students: A Case Study at Oulu Business School (OBS), University of Oulu' 'I am using student and lecture as my population sample. I will be very grateful if you can create time out of your Schedule and answer these questions. Your information will be treated with strict confidentiality and for the purpose of this study.

Thank you for your cooperation.

Best Regard,

Deborah kwafo

SECTION A: DEMOGRAPHIC INFORMATION

1. Sex: Male   Female
2. Marital status: Single   Married
3. Age: 18-25 years   25-32years   32-39 years   39 years above

4. Country of origin: …………………………………
5. What do you do? How long have you been working in university of oulu?
6. Working experience, education?

7. How is your daily work?

8. Position in the organization? (Organization structure in general?)

9. What affects what you do in your work?

10. What do you feel is the most important thing in your work?

SECTION B: QUESTIONNAIRES FOR FACULTY MEMBERS

11. Has the faculty recognised the need for AL integration? if yes why no why?

12. Is there course in management accounting curriculum which is related to AI? if yes why if no why?

13. Does faculty have more knowledgeable expertise for AI to teach accounting student? If yes, why and no why?

14. Does management have good text book the treat AI in management accounting? If yes, why and if no why?

15. Does faculty organised seminar for student on AI? If yes, why if no why?

16. Is there any outgoing research work related to AL in the department? If yes, why and if no why?

QUESTIONNAIRES FOR STUDENT

Dear respondent,

I am Deborah kwafo second year student of University of oulu studying at Oulu business school. I am carrying out research on the Topic "Qualitative Assessments of The Impacts of Artificial Intelligence on Management Accounting Students: A Case Study at Oulu Business School (OBS), University of Oulu' 'I am using student and lecture as my population sample. I will be very grateful if you can create time out of your schedule and answer these questions. Your information will be treated with strict confidentiality and for the purpose of this study.

Thank you for your cooperation.

Best Regard,

Deborah kwafo

SECTION A: DEMOGRAPHIC INFORMATION

1. Sex: Male   Female
2. Marital status: Single   Married
3. Age: 18-25 years   25-32years   32-39 years   39 years above
4. Country of origin: …………………………………

SECTION B: QUESTIONNAIRES FOR STUDENTS

5. Have you heard about AI before?
6. Can you describe AI in your own way?
7. Have ever attended any seminar on AI before?
8. Have you ever had any course in AI before?
9. Will the work of management redundant because of AI?
10. Do you think AI can provide better information to management than management accountant?
11. Do you have any skills and knowledge in database management?