THE FUTURE OF MANAGEMENT ACCOUNTING: ARTIFICIAL INTELLIGENCE, MACHINE LEARNING V/S HUMAN

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OPENING SALUTATION

▶ *All protocols observed. Good afternoon Ladies and gentlemen. First and foremost, I would like to thank the Institute of Certified Public Accountants of Kenya (ICPAK) for having given me the opportunity to attend this auspicious function of professionals. I cannot take this for granted since I know our beautiful country, Kenya, is endowed with a large pull of professionals in all the spheres of life. I am humbled by this positive gesture by the institute. Special thanks also go to the committee that organized this event for identifying me as one of the presenters today, I am sincerely grateful and indebted to you, collectively and individually. My presentation this afternoon focuses on ''The future of Management Accounting: Artificial Intelligence, Machine Learning v/s Humans'' as directed in the program that was sent to me. However, before we focus on the future I will first give a brief historical review of Management Accounting so that we can understand where we are coming from, where we are, and where we are going. Therefore, I have organized this paper as follows: Introduction, Future of Management Accounting and Conclusion.*

INTRODUCTION
A Brief Historical Review of Management Accounting

▶ Johnson and Kaplan (1987) assert that the **origin of present day management accounting can be traced back to the Industrial revolution of the 19th century; where most of the management accounting practices that were in use in the 1980's had been developed. They argue that by 1925, those practices were already developed even though for the sixty years that followed, management accounting was characterized by a slow-down or even a halt in innovation.** The halt in management accounting innovation can be attributed to the increased need for product cost information for external reporting through financial accounting statements/ reports. **The emergency of the joint stock companies during this period created the separation of the ownership and management of organizations hence the need for stewardship responsibility.** Johnson and Kaplan believe that this stewardship responsibility coupled with legislation led to the development of financial accounting which generated published financial statements for investors, creditors, government and other stakeholders, summarizing the financial position of the

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- organization. Further legislation also made it mandatory for companies to publish audited periodic financial reports. **The accounting profession also got more organized and issued a requirement for the published reports to also conform to a set of rules known as Generally Accepted Accounting Principles (GAAPs). In order to prepare financial statements for external reporting, there was need to allocate costs between cost of goods sold and inventories, hence cost accounting emerged to meet this need.** Simple cost allocation procedures were developed that allocated costs to products and services in a manner that was objective and verifiable. However, such costs were not very accurate in a broad range of decision making situations (e.g. distinguishing between profitable and unprofitable products/services) and yet they were still being used for management accounting purposes. **This use of irrelevant costing systems for management accounting purposes continued to the late 1980s,** hence when information systems were being automated in the 1960s the system designers simply automated the 1920s manual systems.

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- The complacency in management accounting innovation led to a lot of criticisms in the 1980s, that in view of the changing environment firms were using management accounting systems that were obsolete and no longer relevant to the changing competitive and manufacturing environments. **In 1987 Johnson and Kaplan created a lot of publicity on the irrelevance of management accounting when they published a book entitled, ''Relevance Lost: The Rise and Fall of Management Accounting''.** The increased criticism during this period led to management accounting practitioners and academics to seek to modify and come up with new techniques that are relevant to today's environment such as ABC, JIT, target costing, cost of quality, investment and product life cycle management, balanced scorecard and other related concepts. As this was happening different terms were coined in relation to the management accounting innovation, such as strategic cost management, strategic management accounting, etc.

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- **In 1989, Bromwich and Bhimani published a report entitled, "Management Accounting: Evolution and not Revolution" and a follow up report in 1994 entitled, "Management Accounting: Pathways to Progress" where they focused on the need for organizations to embrace strategic management accounting. They contended that organizations needed to develop strategies that match their internal capabilities with available opportunities in order to meet their objectives.** This has been extended to include emphasis on developing an integrated framework of performance measurements that can be used to clarify, communicate and manage strategy. Therefore performance measurement has been incorporated as part of strategic management accounting process.

The Future of Management Accounting
Changes in the Management Accounting Function

- **There has been a lot of research focusing on changes within the management accounting function. Birkett (1989), conducted a study in Australia and found that the purpose of management accounting was to "provide management with the necessary key information as quickly and accurately as possible, to enable appropriate action to be taken".** Barbera (1996a), established that the management accounting function was….value-adding participation in organizational processes of strategy formulation, control, and change". Significantly the terms 'value adding', 'organizational processes', 'strategy' and 'change' had been included in the definition reflecting the changes in the business environment and management philosophies, as well as changes in the management accountant's role. **Thus, international literature views management accountant's role as: business analyst; strategy formulator; internal consultant or advisor (or business partner); information provider (or knowledge worker, the hub for data); leader of and/ or participator in cross functional teams; designer and manager of information systems; designer and controller of performance measurement systems; teacher, guide or educator; and interpreter and manager of complexity.**

Changes in the Tasks Performed by Management Accountants

▶ **According to Zarowin (1997), in the future, management accounting will develop in areas involving "a broad spectrum of cross-functional disciplines" such as: performance management (e.g. developing key financial and non-financial indicators); Asset management (e.g. managing a product through its life cycle); Business control management (e.g. corporate governance and internet control frameworks); Environmental management (e.g. accounting for the environment); Financial management (e.g. activity based management); Intellectual capital management (e.g. measuring and managing employee satisfaction); Information management (e.g. implementing and generating value from e-commerce); Quality management (e.g. implementing TQM within an organization and managing quality improvements); and Strategic management (e.g. value chain analysis for assessing competitive advantage).** The amount of emphasis placed on each of these areas depends on individual organizational factors such as size, industry and individual business needs.

Changes in Skills Required by Management Accountants

▶ **According to Barbera (1996b), the change in skills required by management accountants include, personal skills i.e. tolerance of ambiguity, ability to take leadership roles; interpersonal skills to help facilitate work in cross-functional teams, employee empowerment, and the consultative/ educative role, and analytic / constructive skills to facilitate the business analyst, change agent and strategy formulator roles. Others include an ability to intuitive, synthetic and creative thinking; proactivity and innovativeness and organizational design skills; communication (oral, written and presentation) skills; ability to work in a team; analytical skills; solid understanding of accounting; an understanding of how a business functions; data modeling; making forecasts and projections; developing assumptions and criteria; analyzing processes; being adaptable and not resistant to change; and being strategic and forward looking. In addition accountants should have more foresight, be less backward looking, and more risk taking.**

▶ Burns et al (1999), Russell et al (1999) and Sharma (1998), gave the most prevalent change factors as globalization of markets, advances in production and information technologies, and increasing competition. Thus, the management accountant at an organizational level will focus on core competencies, give emphasis on supplier and customer relationships, outsourcing, downsizing, flatter organizational structures and team work. The changes that have been identified above have already impacted on how organizations operate, trade and are managed.

Changes in Skills Required by Management Accountants

▶ **The adoption of computerized accounting in the recent past has meant that management accountants are no longer focusing on "number crunching" and "bean counting" but rather utilizing their slack time on analyse and interpret the information produced. Thus, information technology coupled with globalization of markets has directly affected the tasks conducted by the management accountants.** The enhancement of production technologies and increased competition has made organizations to focus more on customer relationships and improved quality of products and services. Firms have been forced to compete more on price, quality, speed of delivery and customer service, hence management accountants must provide measures and performance indicators on all these factors as information gurus. If management accountants were to fail in this role other information experts would fill the void and render management accountants less relevant (Binnersley 1997). Management accountants should therefore move away from their traditional "number crunching" and focus more on how to add value and become more integrated into the organization. Russel et al (1999) contend that the management accountant must become a valued partner with greater strategic managerial decision making capabilities and move away from being a "bean counter", corporate cop and a financial story teller (financial historian).

Burns et al, 1999 conducted a study in the United Kingdom and found out that in some businesses accountants were changing their job titles to "business analysts" instead of "corporate controllers". Thus it is a pointer to greater changes in the management accounting function into value-adding participation in the organizations processes of strategy formulation, control and change.

Artificial Intelligence

- There has been an exponential growth on the capabilities of computers or machines to perform various tasks since their invention. Human beings have developed the power of computer systems in terms of their diverse working domains, their increasing speed, and reducing size with respect to time. **A branch of computer science known as Artificial intelligence (AI) pursues creating the computers or machines as intelligent as human beings.**

Definition of Artificial Intelligence

- **The most comprehensive definition of Artificial Intelligence was coined by McCarthy in 1956. According to the father of Artificial Intelligence John McCarthy , it is " The science and engineering of making intelligent machines, especially intelligent computer programs. Artificial Intelligence is a way of making a computer, computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.**

- **One can accomplish AI by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.**

Philosophy of AI

▶ **While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, " Can a machine think and behave like humans do?" Thus, the development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.**

Goals of AI

▶ AI has two major goals i.e. **to create Expert systems which exhibit intelligent behavior, learn, demonstrate, explain, and advise its users**, and **to implement human intelligence in machines by creating systems that understand, think, learn, and behave like humans.**

AI, Machine Learning v/s Human

▶ **According to Baptiste J.(2018), Artificial Intelligence is ready for prime-time transforming if not disrupting all the sectors of the economy that generate lots of data, from technology to finance, communication, energy, healthcare, mobility or manufacturing.** This is going to happen after decades stuck in research labs. Baptiste asserts that for more than 500 years, more than most industries, accounting hasn't seen much innovation since the creation of the double-entry bookkeeping, a process of recording both debits and credits and considered one of the greatest advances in the history of business and commerce. **However, recent developments have seen the application of AI and machine learning technologies to bookkeeping as a reality with most of the major accounting Software vendors (Intict, OneUp, Sage and Xero) offering capabilities to automate data entry, reconciliations and sometimes more.**

AI, Machine Learning v/s Human

- **Baptiste contends further that by 2020, accounting tasks-but also tax, payroll, audits, banking, etc. will be fully automated using AI technologies which will disrupt the accounting industry in a way it never was for the last 500 years, creating both opportunities and very serious challenges.** This may appear scaring to many accountants, however, Artificial Intelligence will not replace or eliminate accountants. Machine will however augment the accounting function by doing all the tedious and repetitive tasks which are time consuming and therefore lucrative to the accountant. Well configured Artificial Intelligence systems will eliminate errors that are generally hard to find thereby reducing liability and freeing more time to the accountant to play an advisory role.

- **Marr Bernard (2017), postulated that white-collar workers who are part of the knowledge economy were already beginning to experience what manual laborers experienced in the past when new technologies made their jobs obsolete.** Many professionals fear for their future as machines threaten to overtake them given the improvements we have recently seen in computing. However, instead of accounting professionals developing some fear, its an opportunity for them to be exited for the changes machine learning will have on accounting tasks. Repetitive tasks will shift to machines hence the profession is going to be more interesting. The changes will not completely eliminate human accountants but they will alter their contributions.

Machine Learning

- **Machine Learning is the leading edge of artificial intelligence (AI).** It is a subset of AI where machines can learn by using algorithms to interpret data from the world around us to predict outcomes and learn from successes and failures. As machines infiltrate accounting tasks to take over the more mundane and repetitive tasks , it will free up accountants and bookkeepers to spend more time using their professional knowledge to analyse and interpret the data to provide recommendations for their clients. Innovation in accounting will be propelled by machine learning. When cloud based services were introduced by accounting firms and eliminated desktop support, accounting firms were forced to adopt to life in the cloud. Consequently, **accounting departments and firms will be forced to adopt machine learning to remain competitive since machines can deliver real-time insights, enhance decision making and catapult efficiency.**

Accounting Tasks that Machines Can Learn To Do

▶ **Human workforce will not be eliminated in accounting firms but will have new colleagues-machines-who will pair with them to provide more efficient and effective services to clients.** Machines can learn to perform redundant, repeatable and often at times , extremely time consuming tasks. However, there is currently no machine replacement for the emotional intelligence requirements of accounting work. Some of the possibilities that machines can take over include; auditing of expense submission where machines could learn a company's expense policy, read receipts and audit expense claims to ensure compliance and only identify and forward questionable claims to humans for approval. Machines could therefore handle the bulk if this task.

▶ **Machines could clear invoice payments.** When customers submit payment that might combine multiple invoices or that don't match any invoice in the accounting system, its time consuming for accounts receivable staff to apply payment correctly without making a call to the client or trying to determine the right combination of invoices. Smart machines could easily analyse the possible invoices and can match the paid amount to the right combination of invoices, clear out short payments or automatically generate an invoice to reflect the short payment without any human intervention.

Accounting Tasks that Machines Can Learn To Do

▶ **Machines can do risk assessment.** Machine Learning could facilitate risk assessment mapping by pulling data from every project a company had ever completed to compare it to a proposed project. This very comprehensive assessment would be impossible for humans to do on this scale and under a similar time line.

▶ **Machines can do Analytics calculation.** The accounting department is usually asked many questions, such as, "What was our revenue for this product in third quarter last year?" Or "How has this division grown over the last 10 years?" Given the data intelligent machines can learn to answer these questions very quickly.

▶ **Machine can do Siri-type interface for business finance.** Pegg, an application that works with the messaging application, Slack, is already showing what's possible in terms of creating invoices, responding to questions about revenue projections, and status of expense accounts, This application as well as other conversational interfaces have huge potential to disrupt accounting and make some tasks as simple as chatting.

Accounting Tasks that Machines Can Learn To Do

▶ **Machines can do Automated invoice categorization.** Accounting software firm, Xero is deploying a machine learning automation system that will be able to learn over time how to categorise invoices, something that currently requires accountants to do manually.

▶ **Machines can do bank reconciliations.** Machines can learn how to completely automate bank reconciliations. As accounting firms and departments begin to rely more heavily on machines to do heavy lifting of calculating, reconciliations, and responding to enquiries from other team members and clients about balances and verifying information, accountants and bookkeepers will be able to deliver more value to their clients and handle more clients than ever before.

Conclusion

- **Robots will not take over the jobs of management accountants,** at least not in the near future despite the progress made in the development of Artificial Intelligence. However, AI has moved beyond taking over repetitive tasks and now contributes to **helping professionals make smarter decisions.** AI now helps professionals with tasks that involve data gathering, management and analysis. The development in AI technology is even more relevant for managerial accountants. These accounting professionals aim to provide the company's management with critical accounting information that will help the make better decisions. **With artificial intelligence entering financial and accounting services, it is important to assess how the technology redefines the roles of managerial accountants. It is therefore high time for every accountant to reflect on their job, identify the opportunities machine learning could offer them , and focus less on the tasks that can be automated and more on those inherently human aspects of their jobs** (Martinez C.J., 2018).

▶ Thank you very much for listening to me

Conclusion