

# Strategic management accounting practices between developed and emerging economies using Machine Learning

Dr. Mohammad Salameh Almahairah

Isra University Jordan

mohammad.almahirah@iu.edu.jo

Dr. Vinod Kumar Saroha

Assistant Professor, CSE and IT Department Bhagat Phool Singh Mahila Vishwavidyalaya, Khanpur Kalan, Sonipat.  
Sonipat

Pin: 131305 Haryana India

[vnd.saroha@gmail.com](mailto:vnd.saroha@gmail.com)

Anju Asokan

Assistant professor Sri eshwar college of engineering

Coimbatore 641202

[anjuasokan@sece.ac.in](mailto:anjuasokan@sece.ac.in)

Dr. P. Umaeswari

Associate Professor, Department of Computer Science and Business Systems,

R. M. K. Engineering College,

Kavaraipettai - 601206.

Javed Akhtar Khan

ASSOCIATE Professor INDUR INSTITUTE of Engineering and Technology

Computer science and engineering

[er.javedkhan@gmail.com](mailto:er.javedkhan@gmail.com)

Dr Melanie Elizabeth Lourens

Deputy Dean: Faculty of Management Sciences Durban University of Technology, Durban KwaZulu-Natal, South  
Africa

Email: [Melaniel@dut.ac.za](mailto:Melaniel@dut.ac.za)

Orcid number: 0000-0002-4288-8277"

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## Abstract

Data's function is changing dramatically, but new technologies like machine learning (ML) is also transforming how we can handle and use the data (AI). Nearly astounding are the changes, their pace and scope, and how they affect practically every facet of daily life, including management accounting of course. In this purview, the term "data" refers to business data in its broadest definition. Computers can now learn from experience much like humans and decision-makers do thanks to machine learning (ML). ML and AI for the management accountants have occasionally been considered in the previous 5 to 10 years, despite the fact that these ideas have been applied for a long time in other company disciplines like banking and logistics. Due to the critical role that management accountants play in an organization's success; this study demonstrates the need for greater research on numerous developing technologies in a timely manner. To make more accurate forecasts and enhance reporting and decision-making, many firms must use business intelligence and analytics technologies, machine learning algorithms, and

the Internet of Things. This study explores the effects of new technology on management accountants' abilities to lead business units to success in international marketplaces. It does so by examining, describing, analyzing, and summarizing some of that research.

Keywords: Machine learning, decisions, management accountant, analytics, Management accounting

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## 1. Introduction

The most important component of the information system is accounting. According to S. Briciu, the management activity that uses accounting information depends on a variety of variables, including: confidentiality, urgency, the level of management to which it is addressed, etc. [1]The information system must be able to give the management the information he requests when the manager specifies the data he need. Managers require pertinent information that supports their planning, decision-making, as well as the implementation and management of those decisions.

Managerial Accounting (MA) has developed from the old costing practices that gave managers pertinent information to the more recent standards of Activity Based Costing and the Balanced Scorecard approach that offer value. [2]The first source of information that allows for corroborated decisions to be made in order to achieve stationary goals is managerial accounting. Due to the advent of globalization, managerial accounting has changed its function and increased its management utility. Organizational profitability is enabled by profitable managerial decisions, and accounting supports wise managerial judgments. The Management were criticized in the 1980s for being overly depends on internally operational difficulties that offered a few to the management in terms of formulating strategy and maintaining competitive advantage. Management was intended to optimize the decision-enabling substance of accounting. Simmonds introduced and defined strategic management accounting (SMA) as[3] "the provision and analysis of management accounting data about a business and its competitors, for use in developing and monitoring business strategy" in recognition of the significance for a wider effect of accounting on the managerial decision-taking.

The emphasis on the necessity for organizations to adopt strategic management accounting theory in view to improve strategic decision-taking and organizational performance has since increased. Organizations that want to improve their performance and competitiveness must, as correctly pointed out by, not only to setup but also "implement internal policies and procedures, such as strategic management accounting, that are consistent with their business strategies and account for changing competitive demands." By doing so, the strategic management accounting instrument can be successfully applied to promote business goal achievement. This is the central claim made in the study.

The challenge of delighting clients profit making is increasing. Organizations must acknowledge the value of making wise decisions in order to meet this issue. In order for organizations to make wise decisions, accountants are crucial.[4] The organization can assess its ability to continue operating by using accounting information. Accounting gives management the necessary data they need to ensure and maintain growth and profitability. The strategic management accounting foundation emphasizes that in order for accounting practices to fully fulfil their role of supporting management decision-making, they must not only focus on the internal but also on the external elements connected to the organization's operations. In other words, the major areas of focus for accounting should be costing, planning, control, and performance assessment, strategic decision-making, customer accounting, and competitor accounting.

### Accounting for strategic management: definition and methods

For the purpose of managerial decision-making and its control tasks, management accounting is also described as the "creation, communication, and utilization of financial and non-financial information." [5] Facts are that accountants have barely played a aggressive role in the field of strategic management procedure has been a prominent criticism of accounting in the 1980s. Although the term "strategic management" has been defined differently, Nixon and Burns state there is "broad consensus" that the main activities are (1) fostering a fantastic system, reason, or internal compass, (2) figuring out strategic objectives and plans to accomplish them, (3) setting strategies in motion, and (4) observing, assessing, and making a restorative move. Viable independent direction is

the motivation behind management accounting, which normally involves data social event and investigation, choice ID, execution, observing, and assessment. To really empower management independent direction and hierarchical execution, strategic management accounting, otherwise called accounting for strategic situating, embraces a more extensive methodology that integrates a strategic management center into its elements.[25-67]

#### **Related study of strategic management accounting (SMA)**

Causing highly publicized criticisms of conventional management accounting methods (MAP), which was generally inward engaged and not strategically arranged, the staggering interest and different review in strategic management accounting (SMA) began. There is no agreement on the definition of SMA based on the accounting literature from 1982 to 2022 that has been analysed.

SMA, in Coad's opinion, is a field that many academics are keenly interested in and that interest is expanding, but which lacks a consensus on the specifics of what [5]SMA is or how it might develop in the future. The body of research in the area is fragmented and inconsistent.

In a similar vein, Nguyen and Nguyen () claim that despite Simmonds being the person to first invent the phrase "strategic management accounting," there is still no agreement among scholars on what the term means. For this reason, each scholar defines SMA from a different personal vantage point. Nevertheless, most studies consistently highlight three basic aspects of SMA: an external environment orientation, the investigation of both financial and non-financial data, and a long-term perspective.[70-94]

#### **Ongoing Machine Learning Applications in Accounting And Auditing**

Machine learning applications can profit from the mechanical and monotonous nature of most of accounting and evaluating jobs. [6]Machine learning simplifies it to computerize normal accounting assignments like overseeing money due and payable, making cost reports, and chance appraisal. For example, PC learning calculations can coordinate a got receipt with a relating buy request, recognize the proper business ledger for acknowledgment, and spot the receipt in an installment pool where a human laborer can survey and present the installment solicitation to the installment line. Big Four accounting firms have made huge interests in innovation headways and made various stages and arrangements that utilize machine learning and man-made brainpower calculations because of the advantages of applying machine learning methods. There are more modest ventures for accounting reevaluating administrations that utilization machine learning capacities for accounting or expense announcement purposes notwithstanding the stages and apparatuses that have been laid out.

Zeroing in on the apparatuses and advancements made by Big Four, the ongoing purposes of machine learning have been analyzed as Big Four organizations follow the latest progressions in the field of accounting and review.

#### **Comparative study of big four in AI Equipped Accounting Techniques**

- **Deloitte**

Argus is the Deloitte's first ever cognitive auditing tool that identifies and extracts crucial financial data using cutting-edge machine learning algorithms. information derived from digital documents. Rather than testing, information removed from the whole populace can be utilized with Argus' virtual eyes to identify potential risks, anomalies, and trends.

Originally created for the auditing and the tax customers and also used for the consulting, Cortex is a cloud-based analytics application financial and risk advisory services. Cortex offers big data management, machine learning algorithms, modelling, and the centralized data storage and trends. By combining digital technologies, machine learning, and other technologies, Omnia DNAV revolutionizes the audit of securities and investments. [7]To produce high-quality audits, data science, learning, and auditor judgement are combined.

Data from external vendors and clients are transformed by Omnia DNAV to provide a new method for performing valuations utilizing smart algorithms for big journal entry datasets, Optix offers powerful data analysis to find the transactions that auditors could find interesting. Signal is a risk analytics programme that analyses readily accessible financial data to spot potential dangers so that a thorough risk ascertainment can be made. Customers may receive risk assessments.

By Signal, the examination Teams are able to recognise other risk elements, such as material misstatement and failure hazards. In order to provide predictive modelling that can assist auditors in identifying specific accounts, the programme "Reveal" tests account balances and identifies relationships areas of interest for audits

Sonar is a tool that assists in swiftly and properly verifying data entered by people, such as product information in a client database recognizes labelling mistakes and provides information on the product's description, [8] VAT percentage for each item, code of commodity, barcode, and other essential data through databases.

The GRAPA (Guided Risk Assessment Personal Assistant) assists in developing a risk strategy by drawing on the collective knowledge of every auditor. By using GRAPA, an auditor may distinguish their selected risk approach from every other method that has been applied in prior audits.

A cognitive chatbot named HR Agent Edgy can communicate with both current workers and potential new hires. Additionally, Edgy can answer questions from workers, help employees submit expense claims, keep track of employees' sick days, or pair together candidates with open positions. A machine learning programme created exclusively for contract analysis is called DocQMiner. Regarding IFRS 16's guidelines, every lease

The balance statement should include a list of contracts. The necessary data can be extracted from those contracts using DocQMiner. [9] A technology called Eagle Eye searches the internet to determine whether an organization is probably going to before long experience monetary trouble. Conventional Checking frameworks look at ledgers, credit moves, and fiscal reports. Sharp vision, then again, looks for early advance notice signals before the budget report based trouble makers are seen overwhelmingly of information, evaluating and correlating it, and identifying certain patterns).

An aid in judicial situations is a self-learning technology called BrainSpace. BrainSpace searches through information using machine learning and cluster analysis analyzing unstructured material to determine what can be utilised as proof to bolster the client's defence. Additionally, it offers visually pleasing formats for supplying the necessary data

- **Earnst and Young (EY)**

EY utilize machine learning techniques to examine and extract information from unstructured information to accumulate extra review proof and to assess massive datasets for determining the likelihood that there will be material misstatement as a result of fraud. Applications for machine learning improvised accuracy, speed, and the amount of documents that may be analysed.

The first online platform, Canvas, offers reliable review coordination and management paying little mind to estimate, geology, or intricacy by associating review specialists with their clients. Material offers speedy customization of the review technique attributable to changes in the administrative climate, moment detailing of results, and constant checking of the review and significant achievements in the review cycle (EY, EY Canvas).

All audit teams have access to Helix, a global analytics platform that can manage information of any size and incorporate the analytical audit approach into the business' process. The platform evaluates the riskiness of a client's mortgage portfolio, [10] determines any hidden patterns, trends, and anomalies, and analyses journal entries, revenue and expenses, trade receivable and payable activities, inventory movements and records. Helix allows auditors to concentrate on performing a high-quality audit rather than having to spend time gathering data (EY, EY Helix).

Blockchain Analyzer: As assistance for audit procedures, it increases transparency on client blockchain transactions (EY, Audit Innovation).

#### **PwC**

The ground-breaking bot GL.ai utilizes machine learning calculations to break down colossal measures of information, including transferred exchanges, the clients, sums, and records in every exchange, to recognize expected blunders or extortion dispassionately. The other modules of PwC's Audit.ai are being developed to improve auditing quality, client service, efficiency and (PwC, Outfitting the force of computer based intelligence to change the discovery of extortion and blunder).GL.ai is the first module of this platform.

#### **Cash.ai:**

(PwC, Harnessing AI to pioneer new approaches to the audit) is another device that leads a completely robotized cash review by inspecting cash adjusts, bank compromises and affirmation letters, unfamiliar trade, and the monetary state of the bank.

**Halo:**

is a data auditing technology that enhances risk assessment by analysing massive amounts of data. By using graphical visualisations, it identifies high-risk transactions and draws attention to trends and odd relationships (PwC, The PwC Audit). "Halo for Employee Expenses" provides a proper classification of expenses for tax purposes, discovers irregularities, and aligns policies to save costs (PwC, Halo for Employee Expenses).

	EY	pwC	Deloitte	KPMG
<b>Tax &amp; Legal</b>			Sonar	
<b>Audit</b>	Canvas		Argus	Clara
	Helix		Optix	
	Blockchain Analyzer		Signal	
			Cortex	
			Reveal	
			Omnia DNAV	
			GRAPA	
<b>Consulting</b>			HR Agent Edgy	
<b>Risk Advisory</b>			DocQMiner	
			Eagle Eye	
<b>Financial Advisory</b>			BrainSpace	

Table 1: The Tools Setup by the Big Four Accounting Companies

Year	Award	Innovation
2016	Deloitte	Argus
2017	pwC	Halo
2018	pwC	GL.ai
2019	Deloitte	Cortex
2020	pwC	Cash.ai
2021	Deloitte	Omnia DNAV

Table 2: Audit Innovation of the Year: Awards of International Accounting Bulletin [16]

## 2. Research Design

An online questionnaire survey was used to carry out the investigation. The member list of the **Berlin** and **Barcelona** Chambers of Commerce served as the source for the sample of businesses chosen for this study. There were 115 businesses on the list, all of which were industrial manufacturer SMEs with fewer than 250 employees in 2021 and head offices in the provinces of **Berlin** and **Barcelona**. Due to bankruptcy, relocation, or outright refusal to participate in the survey, 11 companies in **Berlin** and 16 companies in **Barcelona** were excluded from the study. [11] The owners or senior managers of SMEs in **Berlin** and **Barcelona** that make industrial goods participated in the survey. Based on their sales turnover, work force size, and initial investment expenses, the current research was

conducted on 87 industrial manufacturing SMEs (40 firms were from **Berlin**, and the remaining 47 enterprises were from Barcelona).

### 3. Analysis

The SMEs in **Berlin** and Barcelona that produce industrial goods were examined according to their size, age, and line of work. A firm's size was established based on their labour costs, typical financial turnover, and investment costs. Prior to that, the legitimacy and dependability of the evaluated organisations were examined application and evaluation of the models' hypotheses. Reason for explanation analysis based on the Varimax and main component extraction method Utilizing the rotation method, factor loadings can be more clearly understood for the scale's validity and dependability.

$$Z_{pxl} = \lambda_{pxm}F_{mxi} + E_{pxl}$$

Z is a px1 independent variable vector, and is a pxm factor-related matrix. E is a px1 vector of error factors, and F is a mx1 vector of factors for loadings. As factor Eigen values were applied to the analysis to generate a correlation matrix.

The first research model used a multiple regression model to examine how strategic management accounting techniques affected the choice of an efficient investment strategy. "Strategic management accounting techniques have no impact on the efficiency of making investment decisions," was the model's null hypothesis.

### Results

The average age of industrial SMEs in Barcelona is 24.8 years, compared to 19.9 years for industrial manufacturer SMEs in **Berlin**. %12,77 of participants in Barcelona omitted to mention the age of their company.

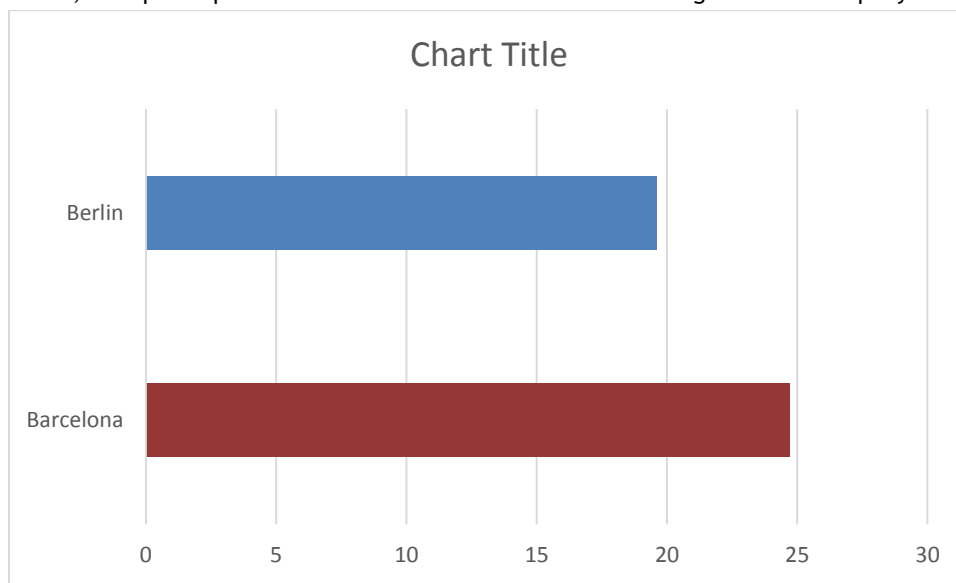
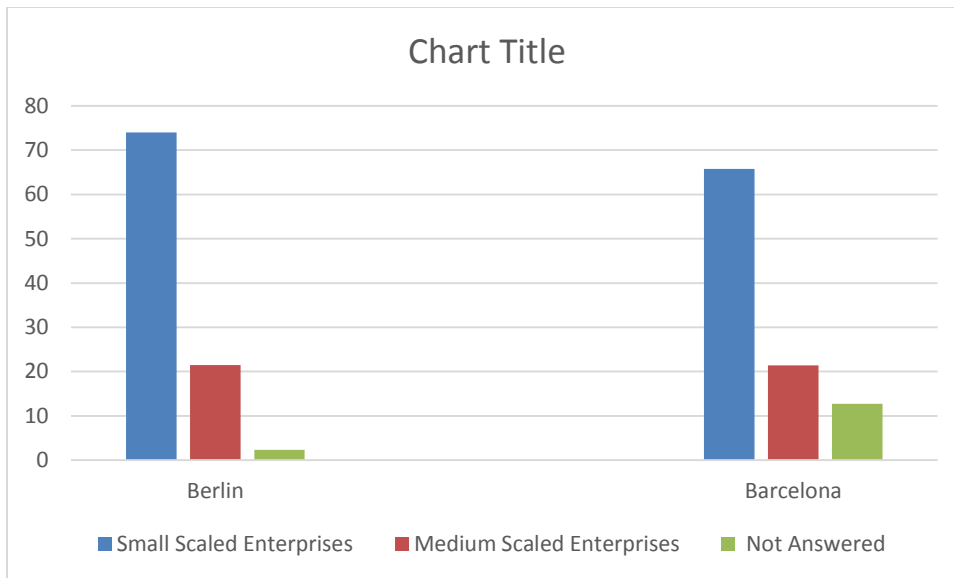


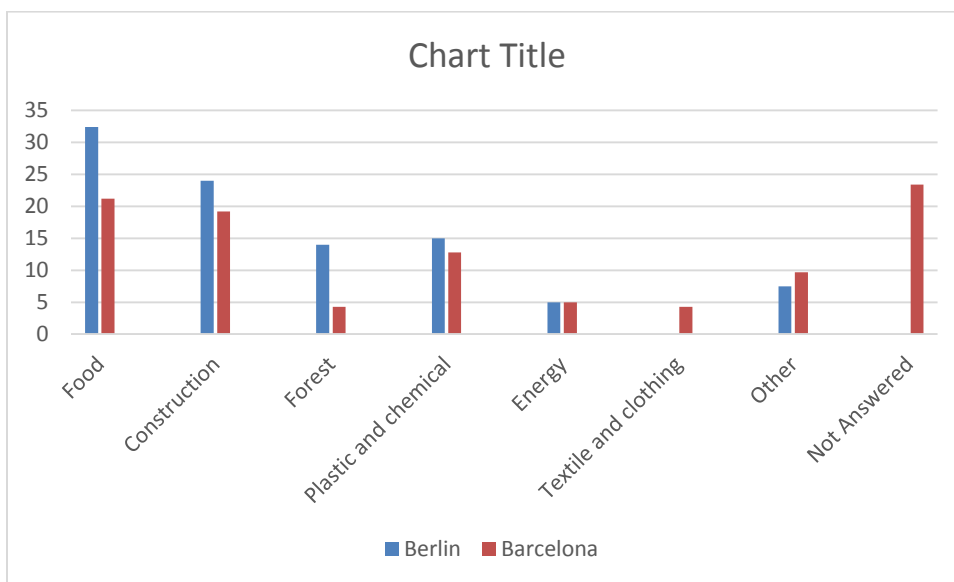
Figure 1: Ages of SMEs that produce industrial goods in **Berlin** and Barcelona (Average Age)

When industrial manufacturer SMEs in the provinces of **Berlin** and Barcelona were categorised based on the typical number of employees. Small- and medium-sized enterprises (SMEs) are defined as having fewer than 50 employees and as having between 50 and 200 employees, respectively.



**Figure 2: Firm sizes of SMEs in Berlin and Barcelona that produce industrial goods (%)**

In **Berlin**, %75 of businesses with fewer than 50 employees were referred to as small scale businesses, while %22,5 of businesses with between 50 and 200 employees were referred to as medium scale businesses. In **Barcelona**, %65,95 of businesses with fewer than 50 employees were referred to as small scale businesses, while %21,28 of businesses with between 50 and 200 employees were referred to as medium scale businesses. In the study, 2,5 participants in **Berlin** and 12,77 participants in **Barcelona** failed to specify the size of their firms.



**Figure 3: Industrial manufacturer SMEs in Berlin and Barcelona by activity fields (%)**

### Summary and Suggestions

Utilizing performance measurement, cost management, and production process innovation, strategic management accounting promotes harmony between organizational designs and strategic variables (strategic planning, strategic formulation, strategic control, etc). [12] The study's goal is to evaluate how strategic management accounting

methodologies affect the investment choices made by manufacturer SMEs in Berlin and Barcelona. The study's hypothesis was put to the test using multiple linear regression analysis. Three theories had been discarded. This indicates that the effectiveness, simplicity, and speed of investment decisions made by SMEs in the industrial manufacturing sector in Berlin and Barcelona appear to be favorably influenced by strategic management accounting procedures.

The results of this study show that JIT, followed by BSC and TC, had the highest rate of impact on the effectiveness of investment decision-making. BSC, JIT, and TC were the three factors that had the greatest impact on how easy it was to make investment decisions. JIT, followed by TC and BSC, had the greatest impact on the speed of investment decision-making. The development of new technologies like machine learning led to new methods of work completion, which affected the bookkeeping and reviewing callings. [13] In spite of these issues, utilizing machine learning procedures has a few advantages, including further developed productivity and viability through quicker information handling, top notch review, botch decrease, early gamble distinguishing proof, and the formation of an upper hand.

The Big Four organizations have thusly made different instruments and are continuously adding to their rundown of machine learning drives. [14] According to predictions, machine learning and artificial intelligence platforms will handle 30% of corporate audits by 2025. The quick development of this profession in terms of execution also emphasizes the necessity of moral leadership. [15] The application of artificial intelligence and machine learning techniques by accounting and auditing organizations also need regulatory oversight and direction.

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