
Auditing New approach of Credit loss for Financial Institutions in The Audit Data Analytics Era: A field Study in Egypt

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Abstract

Purpose-The main objective of the study to propose Audit Data Analytic Tools (ADA) to develop the role of the External Auditor in enhancing the communication of the Expected Credit Loss (ECL) estimate as a very complex and subjective item of Critical Audit Matters (CAMs) of the New Audit Report.

Design/methodology/approach- The study depends on uses of the field approach through a questionnaire distributed by the researcher to academic staff members of some selected universities and the audit professionals whether the internal auditors in banks listed and controlled by the Egyptian central bank & the external auditors registered in the financial regulatory authority of the big auditing firm in Egypt with expertise in the banking industry sector (i.e PwC, KPMG ,Grand Thornton ,EY) to test the relevance of the proposed framework for CAMs communication.

Findings-The findings of the study show the significant importance of ECL *i.e.*, CAMs Communication to the financial statement users as it promotes the user to the audit report and finally improves the understanding and relevance of the related financial statements. Thus, When the CAMs disclosures in the audit report are provide, investors may be more confident that the auditors have determined and appropriately addressed the most highly risky assertions in the financial statements which reflect on the audit quality.

Originality/value-This study contributes to the audit literature by proposing a suitable Audit Data analytics tool (tools) to develop an independent estimate (i.e. Point of estimate) for the new ECL as a very complex and subjective CAMs item in order to stand on its reasonableness by the external auditor. As well as proposing the relevant form for communicating such information as a CAMs in the 1 audit report.

Keywords-Expected Credit loss (ECL), Critical Audit Matters (CAMs), Audit Data Analytics (ADA), Regression Analysis, Ratio Analysis-Logistic Regression, Uncertainty-Precision Rate-Variance Rate-Management Bias, Probability of Default (PD), Loss Given Default (LGD), Exposure at Default (EAD).

Paper type- research paper.

1. Introduction

Concerning an unqualified opinion, The Public Company Accounting Oversight Board (PCAOB) in the year 2016 proposes that the audit report disclose “Critical Audit Matters” (if any) in areas such as estimates, audit judgments, areas of special risk, unusual transactions, and other significant changes in the financial statements. Modern audit engagements frequently include an examination of clients who use big data and analytics to stay competitive and relevant in today's business environment. In addition, many engagement clients are now combining big data with new and complex business analytical approaches to generate intelligence for decision making. This scenario presents almost limitless opportunities as well as a pressing need for the external auditor to employ advanced analytics.(Appelbaum & Vasarely, 2017). Also based on the international perspective the International Auditing & Assurance Standard Board (IAASB) make revise on the standards related to the audit report in 2015 and issue new audit standard 701 related to Key Audit Matters. The remainder of this paper is organized as follows: Section 1 provides a review of the relevant literature related to this study. Section 2 describes the research methodology, andSection 3 provides the research findings and discussion. The conclusion section discusses key observations from the analysis, limitations of the study and implications for future research.

2. Background and prior research

2.1 The Significance of Critical Audit Matters (CAMs) in the Audit report Paradigm

The model pass/fail of the standardized audit report has been criticized for failing to provide stakeholders with any detail other than the qualified vs. unqualified opinion. This critique identifies aspects where the report has lacked in those areas, such as ambiguity about the auditor's role and what happens during an audit. Such ambiguity seems to have resulted in what is known as an expectations gap, in which users and auditors have different perspectives on the audit report's communications. Attempts have been made over the years to address this gap (Pelzer, 2016).a Critical audit matter "CAMs" defined as “any matter arising from the audit of the financial statements that was communicated or required to be communicated to the audit committee and that relates to accounts or disclosures that are material to the financial statements and involved especially challenging, subjective, or complex auditor judgment”. (PCAOB, 2017, p16)CAMs will attract the user's attention to the auditor's report and finally increase the visibility of the financial statement. This because users view CAMS as a guide and prompt them to take a closer look at the corresponding disclosure. CAMs have a strong communicating role in defining and attending to the relevant details when conducting a financial statement audit by highlighting those areas of the financial statement. Accordingly, when a financial statement disclosure is referred to in the auditor's report as a CAMS, it is expected that users will access the related disclosure (i.e., CAMS-related) more rapidly and pay greater attention to it. (Bedrad & Bera, 2018)The decision of an auditor to record a matter as a CAMS lead to highlight this matter, consequently this will increase managers' awareness of the issue and will increase their knowledge of this topic. Thus, due to changes in incentives, the management will be more likely to raise the disclosure level for the CAMS topic.

Management would benefit less from a lack of disclosure because they would expect investors to ask "fill in the blanks." Furthermore, if the matter is brought to the attention of the auditor, management's focus will shift to its reputation and litigation risk, both of which necessitate increased disclosure. Moreover, if the auditor's reporting on the CAMS was more comprehensive and included a detailed discussion of why the auditor was emphasizing the matter, the perceived level of investor knowledge would be even higher, leading to far more disclosure provided by management. (Fuller, 2015) CAMS disclosure, on the other hand, appears to have a positive impact on investors' perceptions of the auditor's influence on financial reporting quality. By disclosing a CAMS, auditor's alert users to an account that has a high risk of misstatement, explain why they believe it is a CAMS, and describe the audit work done to address it. This clear warning and description of additional effort should have a positive impact on perceptions of the auditor's influence on the quality of financial reporting. (Rapley et.al, 2018). Since accounting areas have high risks, such as fair value assessments, which also have a high degree of subjectivity and may have wide reasonable ranges that pose specific difficulties to auditors, drawing investor attention to such details should make investors warier of investing. A CAMS paragraph focused on the audit of fair value estimates influenced investor perception. This is due to the informative value enhancement effect of footnote disclosure combined with a CAMS paragraph in the audit report when compared to footnote disclosure alone. In addition to a source credibility effect for the information in the CAMS paragraph as the auditor's task is to independently opine on the financial statements, whereas management is incentivized to cast themselves in a positive light and thus, the CAMS paragraph is higher than that of management-generated footnote disclosures. (Christensen et.al, 2014). The audit committee is responsible for management's reporting decisions. In order to perform the financial reporting monitoring of the firm, the audit committees communicate with the management and auditors and examine the company's financial statements, disclosures, and audit report. Because management has incentives to avoid public disclosure, as such audit committee's oversight of financial reporting purpose is to restrict management decisions on opportunistic disclosure. So, the extent that an auditor's reporting of a critical accounting estimate as a CAMS increases the scrutiny of management's disclosure decision by the audit committee, as the auditor's reporting on the CAMS is also inconsistent with management's preference. Accordingly, managers facing stronger audit committee oversight should be expected to process more deeply and be more influenced in their disclosure decision by the content of reporting on the CAMS than managers facing only moderate audit committee oversight. (Fuller, 2015)

2.2 Expected Credit Loss (ECL) relevance and challenges in the Audit Paradigm

In IFRS 9, the new impairment model is designed to recognize forecasted or expected credit loss provisions before they occur and to reflect changes in credit risks since their initial recognition during each reporting period. It, therefore, ensures timely recognition of the loss of credit and thus provides the users of the financial statement with more precise and transparent information. On the other hand, credit loss allowances can be stirred up, resulting in volatile profit or losses as a consequence of changes in economic conditions, such as high allowances at unfavorable and low allowances during favorable

economic conditions. Particularly, the financial entities are expected to be the most affected group since they hold a significant portfolio of loans in their financial statements (Sultanoğlu, 2018). The primary goal of IFRS 9's "impairment" is to establish a model of "expected credit losses" indicative of changes in a financial instrument's credit quality, including deterioration or improvement over the remaining expected life. Therefore, IFRS 9 is introduced to the 'Expected Credit Loss Model.' that relies on 'expected loan losses' rather than 'credit losses incurred. In the context of the ECL model, the entity will proactively estimate "expected losses" (ECIs), not only incorporating historical and current data but also reasonable and supportable information, which includes predictions of future economic conditions (forward-looking) (Sultanoğlu, 2018). As a strength of the new approach, the new ECL model, which ensures more precise and timely recognition, uses forward-looking information, improves transparency, caution and makes extensive disclosures. On the other hand, significant judgment levels, implementation operation costs, complex multi-stage credit risk assessments, and significant financial effects were found to be threatening concerning supply levels and regulatory capital. (Sultanoğlu, 2018) Therefore, the relevance and the importance of the new impairment model appears in its prospective concept, which changes greatly in relation to the old IAS 39, which recognizes the losses caused only by previous events and which has been criticized for leading to insufficient and too late losses provisions. Only objective facts could trigger value adjustments under IAS 39. The new impairment model for IFRS 9 is more oriented towards potential future losses and therefore a business should consider far more information in order to determine future credit loss expectations. (Volarevi & Varovi, 2018)

Audit challenges relating to ECL models were identified by the International Auditing and Assurance Standard Task Force. Alternatively, auditors must monitor actively the adoption and implementation of their ECL models by the company. This because of the following reasons (a) the importance of the ECL model and (b) the likely impact that models have on the risk assessment and the audit approach of the auditor of entities with several ECL- financial instruments (IAASB, 2016). The following are audit challenges linked to ECL Models, which are discussed as a guiding point for the determination of auditor responsibilities of the new IFRS9 loss impairment model by the International Audit and Assurance standards Task Force:

2.2.1 Challenges with Data and Assumptions issue:

During the discussions of the task force on this issue "Data and Assumptions issue," it was noted that the complexity of the systems which will feed into the ECL models and their interaction, the need to have data control, and the high volume of financial instruments under ECL may lead to specific challenges of the audit that need to be addressed in the planning stage, for most financial institutions. These are the following challenges: (IAASB, 2016)

- (a) Identification and understanding of key data sources and assumptions.
- (b) Data control and data governance.
- (c) Consideration of alternative data sources and assumptions.
- (d) The level of audit effort determination.

(e) Data analytics: The Task Force notes that the use of new data analytics tools may be valuable in dealing with large data sources that feed into the ECL process.

(f) System interactions.

(g) Data from outside of the entity.

(h) Addressing emerging and “one-off” events.

2.2.2 Identification of Significant Risks of Material Misstatements Related to an ECL Model Issue:

The ECL model calculation requires management to make judgments on model inputs, assumptions, and portfolio segmentation, individual exposures, and whether there was a significant increase in credit risk despite early recognition under certain financial reporting frameworks. Consequently, the ECL provision is high uncertainty in its estimation and therefore could result in one or more significant risks of material misstatements (i.e., significant risks). ECL provisions could also be complex and highly subjective, both indicating the existence of one or more significant risks. (IAASB, 2016)

2.2.3 Audit Procedures on Models: Understanding and Assessing Models and Controls on those models:

The following issues may vary depending on the circumstances (IAASB, 2016).

- The model is validated before use and periodically reviewed in order to ensure its continued application. The validation process of the entity can include an assessment:
- Change control policies, procedures and security controls on the model are appropriate because small changes to the model can lead to major changes to the model results.
- Whether the model has controls to alleviate the risk of historical data bias, for instance, when historical data do not contain events that would impact ECL, even though it is remotely likely to occur.
- The model is periodically calibrated, reviewed, and tested for validity by a separate and objective function, possibly including back testing.
- When management has used a third-party model, whether the design of the model and the assumptions used is reasonable in light of the facts and circumstances of the entity.

2.2.4 Addressing the Estimation Complexity (i.e., Precision) Implicit in ECL Models Issue:

Due to the complexity (i.e., Precision) implied in an ECL model, and the significant level of judgment involved in measuring ECL, there may be a difference between the Management's estimate and the point or range of estimates of the auditor. This can be due to: (IAASB, 2016)

- The required level of judgment could be higher than in other accounting estimates. For example, the assessment of whether the credit risk has been significantly increased by a given financial instrument subject to ECL can in some cases be extremely judgmental.

- The number and sensitivity of assumptions may be greater than for other accounting estimates;
- The length of the forecasted period may be longer than for other accounting estimates.
- An entity may have to consider external source information which may pose audit challenges. For example, in the Financial Reporting Framework, all reasonable and acceptable available information on past events, current conditions, and future economic forecasts may need to be provided without undue cost and effort on the reporting date.

To assess the reasonableness of the management point estimate, ISA 540 requires that the auditor-detailed range include all "reasonable outcomes," which are narrowed to equal or less than the management ECL point estimate, as such for the auditor point estimate. Also, The Task Force notes that the revised auditor reports require that auditors communicate the ECL Disclosures in the auditor's report as the Critical audit matter section. (IAASB, 2016).

2.2.5 Management Bias Issue:

The following may include examples of intentional or unintentional management bias: (IAASB, 2016)

- (a) Override of controls over data, assumptions, and processes.
- (b) Choose data sources for a biased ECL view. As noted, historical information may not contain events or scenarios that are required in forecasts for which the data is biased and manipulated.
- (c) Scenarios to be selected and probabilities for scenarios does not comply with the relevant financial reporting framework (where required by the applicable financial reporting framework).
- (d) Changing from one data source or assumption to another data source or assumption.
- (e) When management overlays are overstated or understated.

2.2.6 Implications for Reporting Issue:

The Task Force noted that the following information can be useful for users: (IAASB, 2016)

- A qualitative or quantitative description of the level or degree of estimation uncertainty of the ECL.
- A description of what matters were most significant to the auditor with regards to the ECL.
- How the audit approached ECL and how experts used procedures under paragraph 13 of ISA 540.
- If the range of auditors existed above materiality, or if the audit point estimate differed materially from the accounting estimate of the management, what additional audit procedures have been carried out to address these issues?
- How the auditor addressed the risk of management bias.
- How the auditor approached the ECL provision.
- The auditor's consideration of the governance and controls over the ECL model.

- The auditor's approach to disclosures about accounting estimates, including the ECL provision.

2.3 Auditor Responsibility Towards ECL audit:

In July of 2017, the Global Public Policy Committee (GPPC) publishing 'The Auditor's Response to the Risk of Material Misstatement Posed by Estimates for Expected Credit Losses accordance to IFRS 9' (the Paper) which shows the auditor responsibilities related to ECL especially in financial entities. This Paper is addressed to a member of the audit committees of financial institutions that are systemically important (SIFIs) and the views contained in the Paper may also be of wider interest to other financial institutions. (Global Public Policy Committee (GPPC), 2017). As the auditors are responsible for objectively assessing and contesting the reasonability of accounting estimates with a risk of material misstatements, and for standing back for such accountability of estimates and objectively evaluating the estimate and challenging those estimate it in the broader context of the Financial Statements as a whole. During the audit, auditors should apply professional skepticism and in particular, auditors should consider and assess how management has reduced potential management bias in estimating and assess the transparency and completeness of management disclosures (GPPC, 2017). Entities will base their judgments in the estimation of ECL, and build their public disclosures, upon certain foundational elements which are: (GPPC, 2017, p17)

- The accounting policies related to ECL estimates.
- Operational procedures and systems of internal control related to ECL estimates.
- Information systems and data related to ECL estimates.
- Estimation models related to ECL estimates.
- Financial statement disclosures related to ECL estimates.

Therefore, the auditor needs to conduct an effective high-quality audit on the ECL estimate by the entity in order to assess the appropriateness of the basic elements of the management judgments of the entity's estimate of ECL and their public disclosures through the following: (GPPC, 2017)

- Have sufficient knowledge of the requirements of each foundation element including whether the auditor has appropriate expertise.
- Perform audit procedures to obtain evidence that ECL has been accurately and consistently applied to each foundation element.
- Assess whether the entity has taken appropriate action to mitigate the risk of management bias of each foundation element.

2.4 The Emergence of Audit Data Analytics Era (ADA):

There have been changes in the audit history in the way the audit is carried out. These changes were caused by changes in the environment in which companies operate and audits are carried out (Data Analytics Working Group (DAWG), 2016). The ever-growing complexity of business, corporate governance reform, risk management, global competition, and the growing demand for high-quality financial and non-financial data, require technology to modernize financial reporting and auditing processes (Rezaee et.al, 2018). Audit data analytics defined as the science and art of discovering and analyzing patterns, identifying anomalies, and extract other useful information in data underlying or related to the subject matter of an audit through analysis, modeling, and visualization for

the purpose of planning or performing the audit (AICPA,2017).Data analytics can be considered as a development of analytical procedures. During audit planning, auditors use analytical procedures and are proven to influence the nature, timing, and extent of substantial tests by auditors. In making more effective fraud risk assessments, analytical procedures assist auditors, especially more experienced auditors. When auditing high-risk clients, the results of the analytical procedures affect auditors' judgments more. When auditors present a lower risk of misstatement, analytical procedures are perceived as stronger audit evidence. Moreover, it has been proved that changing the presentation of analytical procedures results leads to more effective decisions. (Koreff, 2018).

The professional accounting bodies have set up task forces, issued position papers and alerts to meet the leverage of ADA (Audit Data Analytics), and have provided guidance on the increasing use of ADA on audits. Internationally the IAASB stated the use of technology and data analytics offers the auditor the possibility to gain an efficient and robust understanding of the entity and its environment and improve the quality of the auditor's evaluation and the response of risks in a growingly complex and high-volume data context. (Eilifsen et.al, 2019). As a consequence, in 2015, the DAWG was set up to promote IAASB's understanding of BDA concerning the auditing and assurance services and challenges that it creates. The task force, which mainly consists of partners of the large audit companies, has comprise initiated activities to raise awareness, engage views on the ground from various stakeholders and publish milestones of its projects (unlike the AICPA task group with both its firm partners and its academics). The results of those activities show that in the audit environment there are differences in whether standards need to be reconsidered to take BDA into account. This led the DAWG to establish the Consulting Panel on the Data Analytics Project as a technical resource in 2017. The panel draws expertise from regulators, investigators, auditors, and businesses developing BDA tools. (Salijeni et.al, 2018) With the application of audit data analytics (ADA) there is great potential for more objective quantification of the audit opinion. The audit profession could contribute with a greater quantitative opinion to the social and business value. The audit opinion model based on a pass/fail summary is not informative and sufficient for user needs in relation to financial statements. As such major progress in this direction will probably also be beneficial, through providing an audit opinion that can be quantified by revealing the actual measures achieved in the audit in this opinion. Quantification can increase the value of information both internally and externally, and it decreases information asymmetry which is very threatening for agents (managers) and principals (Appelbaum, 2017). For example, PCAOB & IAASB proposes to disclose the audit report critical audit matters (if any) in areas such as estimates, audit judgments, special risk areas, unusual transactions and other significant changes to the accounts. "This proposal poses a series of interesting questions worthwhile: Is the level of proposed disclosure adequate in terms of quantification of these critical audit matters or is it falling back into the comfort zone of the traditional auditor? Would some of these Critical Audit Matters (CAMs) provide disclosures that are more disaggregate, or more informative than the traditional audit reports? Could there be? The organized plan defined by the standard setters of quantification, or quantitative guidelines for estimates, audit judgments, areas of special risk, unusual transactions, or other significant changes in the financial

statements?" (Appelbaum & Vasarhely, 2017, p31). Audit Data Analytics techniques using different big data sources could be used to achieve a quantitative audit opinion, in order to address the criticism of the pass/fail opinion model. It is likely that this process and the resulting opinion could be measured using prescriptive analytics with advanced ADA techniques and reliable evidence. Prescriptive analytics can allow the audit opinion and audit risk to be graduated or ranked (Appelbaum et.al, 2018)

3. Developing a point estimate of ECL as CAMS Communications Through a proposed Audit Data Analytics:

3.1 Perform audit procedures for validating the degree of accuracy and consistency of the model used in calculating ECL provision (Model Precision/Objective Element of The Estimate uncertainty) Through Audit Data Analytics:

3.1.1 The first audit approach Validation of ECL "Use Classification and Regression Trees (CART) also known as decision trees to evaluate the appropriateness of the management judgments Related to the model of estimating ECL:

The development and use of complex models inherently involve the evaluation, including the choice of modeling techniques, the identification, and validation of the model's key inputs. The auditor should evaluate whether management has a validation process for a model, including the validation of the model before initial use and a regular revalidation to see if it continues to be appropriate for the intended use. A **classification tree** is perhaps the simplest form of an algorithm since it consists of a series of yes/no questions, the answer to each deciding the next question be asked until a conclusion is reached. So, the auditor can use this type of algorithm to evaluate the entity validation process of the ECL model on the following areas as prescriptive analytics tool:

- The accuracy of model data.
- The Appropriateness of the forward-looking assumption for developing ECL model
- The Appropriateness of the documentation process of the model assumptions
- The Appropriateness of how the significant increase in credit risk impacts the calculation of ECL captured.
- The Mathematical integrity of the model

The **Figure (1)** shows how the classification trees as ADA tool used to evaluate the appropriateness of the management judgments Related to the model of estimating ECL as follows:

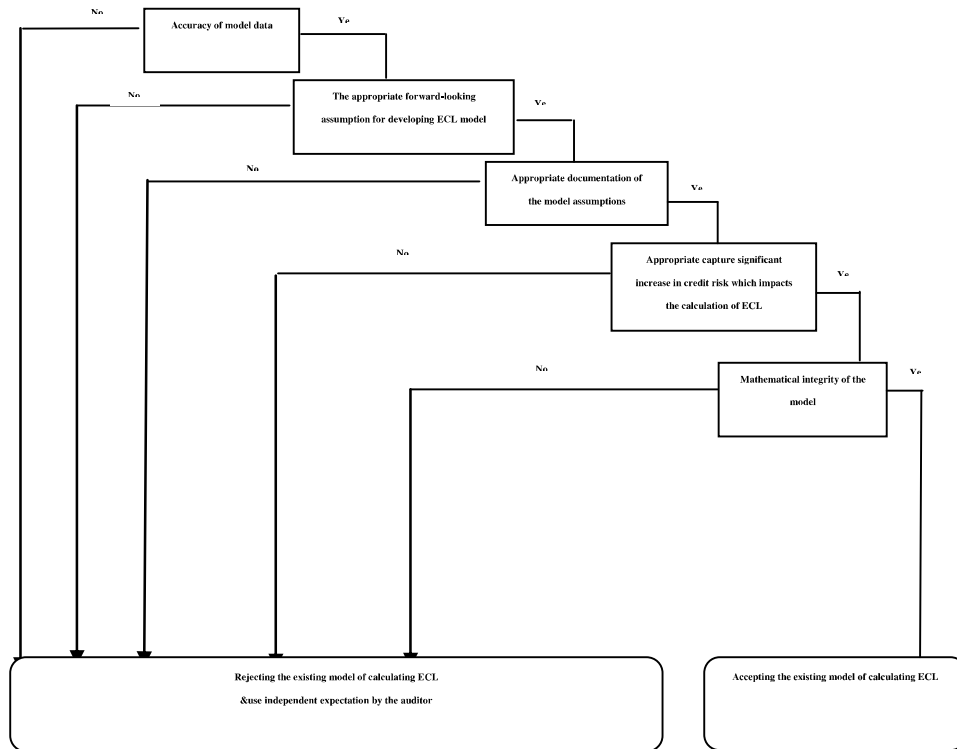


Figure (1) evaluate the appropriateness of the management judgments Related to the model of estimating ECL using the classification trees “**Source Researcher**”

3.1.2 The Second audit approach Validation of ECL "Use the Multi-Linear regression analysis combined with ratio analysis to develop independent estimate

The auditor uses some or all of the auditors' own methods, data, and assumptions to develop the expectation for comparison with the company estimate to develop an independent expectation for an accounting estimate. The auditor also had to consider and understand the company's process, including the major assumptions used by the company, the requirements of the applicable financial reporting framework so that the expectation by the auditor can consider the relevant factors to the estimate (PACOB, 2019). Not all accounting estimates have the same degree of estimation uncertainty. These changes in relation to the nature and reliability of the information that is available to the management to make the estimate. This is referred to as an inherent lack of precision of an estimate and is an objective element of uncertainty. In addition, an estimate may be imprecise because of management bias, that is, lack of neutrality. This is a subjective element of uncertainty, which is not inherent in the estimate itself. The greater the objective element, the lower the space to apply management bias. The higher the degree of estimation uncertainty, the higher the risk of material misstatement of the estimate (Bellandi, 2018, p254)

For a point estimate., if the management estimates differ from the auditors' estimates, the auditor shall discuss, management assumptions and procedures (Bellandi, 2018)

Speaking mathematically, Expected Credit Losses ECL computed as the presented of three variables, where the first variable is **Exposure at Default (EAD)**, the second variable is **Loss Given Default (LGD)** and the third, and the most sensitive variable to determine is **Probability of Default (PD)**(KPMG, 2018). It should be mentioned that the

calculation model should be calculated based on an unbiased and probability-weighted for all scenarios for the amount of ECL to be presented as an impairment to the book value of the financial asset in the Balance sheet (Volareic & Varoic, 2018). Therefore, the auditor can apply the audit data analytics methodology on estimating the value of ECL by relying on regression line and financial ratio techniques.

“A regression line summarizes the relationship between two variables but only in a specific setting—that is to say, one of the variables helps explain or predict the other. Thus, regression describes a relationship between an Exploratory or independent variable and a response or dependent variable. Regression analysis is used to estimate the effect that a movement in one variable (the independent variable) causes a movement in the other variable (dependent variable). Regression analysis can thus assist the auditor in understanding and quantifying data interrelationships. Unusual variations between expectations and recorded values may be noted for further investigation. Ratio analysis assumes a given proportional relationship between two numbers and is normally used for comparisons over time. A more advanced form of ratio analysis attempts to quantify the interrelationship in order to facilitate predictions in a regression analysis”. (Casarino, 2017, p92).

The previous two techniques could be used along with the instruction issued by the Egyptian central bank for the application of IFRS9 2019 in order to provide the external auditor a basis for developing an independent estimate of ECL and comparing it with the management to measure the degree of precision of estimate to measure the objective element of the uncertainty of estimate as follows:

- **Probability of Default** This could be done by using The Egyptian central bank proposed indicators to measure the **Probability of Default (PD sn %)** which is the first variable to estimate ECL which some of its indicators depend on the accounting data from the financial statements, i.e., from the past, in and some other indicators that are more "forward-looking", e.g. Macroeconomic indicators, these indicators are shown in the following table:

Table (1) the indicators of estimating PD sn %¹

Accounting /Past Indicators	Macroeconomic/Forward-looking Indicators
The decline in levels of revenues	Employment
Operating profit	Unemployment
Increase in operating risks	Wage/Salary Growth
Negative operating cash flows	GDP Growth
Increase in interest rates	
Return on Assets	
Deficiency of Working capital	
Contingent liabilities	
Debt Ratio	

¹According to IFRS 9 & Egyptian central bank PD sn % should have 3 values according to 3 scenarios which are the "Basic, Worst & Best"

Receivable Turnover	
Decrease in operating leverage	
Decrease in current ratio	
Increase in financial leverage	

Source: Researcher

The previous indicators could be summarized in the following ratios shown as follows in the following table:

Table (2) Ratios & Coefficients regression for estimating PD sn %

Indicator	Ratio	The coefficient in regression Model to estimate PD%
The decline in levels of revenues	Sales margin	SM
Operating profit	Profit margin	PM
Increase in operating risks	Market share	MS
Negative operating cash flows	Operating cash flow ratio	OCF
Increase in interest rates	Interest rate by E.C.B	IR
Return on Assets	Return on asset	ROA
Deficiency of Working capital	Working Capital ratio	WCR
Contingent liabilities	Contingent liabilities ratio to total liabilities	CLR
Debt Ratio	Debt ratio	DR
Receivable Turnover	Receivable Turnover	RTO
Decrease in operating leverage	Operating leverage	OL
Decrease in current ratio	Current ratio	CR
Increase in financial leverage	Financial Leverage	FL
Unemployment	Unemployment Rate	UNER
Wage/Salary Growth	Salary Growth Rate	SGR
GDP	GDP Growth Rate	GDP
The model error term/Residuals	Error	€

Source: Researcher

Therefore, the following multi-linear regression model based on the previous ratios in order to develop an estimate for PD sn % by the auditor is as follows:

$$\text{PD sn \%} = \beta_0 + \beta_1 \text{ SM} + \beta_2 \text{ PM} + \beta_3 \text{ MS} + \beta_4 \text{ OCF} + \beta_5 \text{ IR} + \beta_6 \text{ ROA} + \beta_7 \text{ WCR} + \beta_8 \text{ CLR} + \beta_9 \text{ DR} + \beta_{10} \text{ RTO} + \beta_{11} \text{ OL} + \beta_{12} \text{ CR} + \beta_{13} \text{ FL} + \beta_{14} \text{ UNER} + \beta_{15} \text{ SGR} + \beta_{16} \text{ GDP} + \epsilon \quad (1)$$

For the other two variables of ECL which is the Loss Given Default (LGD %) and Exposure at Default (EAD) could be calculated as follows:

- **Loss Given Default (LGDsn):** According to the instruction issued by the Egyptian central bank for the application of IFRS9 2019 stated that at least when calculating LGD% should be equal to (45%) or Calculated by the following formula for each of the previously mentioned scenarios:

$$\text{LGD sn} = 1 - (\text{CR sn}) \quad (2)$$

$$\text{Where: CR sn}^2 = \frac{\text{PV of Expected Future CashFlows of Loan\&Debts \&Collateral}}{\text{Total Value of Loans \&Debts \&Collateral}} \quad (3)$$

- **Exposure at Default (EAD):** According to the instruction issued by the Egyptian central bank for the application of IFRS9 2019 stated that:
 - **Loans given** – EAD consists of the principal plus accrued interest up to the reporting date.
 - **Deposits placed** – EAD consists of the principal plus accrued interest up to the reporting date.
 - **Debt securities purchased with a discount (discounted securities)** – EAD is an amortized value plus accrued interest up to the reporting date. Amortized value of a discounted security is its nominal value minus the remaining (unamortized) portion of the discount.
 - **Debt securities purchased with premium** – EAD is an amortized value plus accrued interest up to the reporting date. Amortized value is its nominal value plus an unamortized portion of premium.
 - **Trade receivables** – EAD amount is the nominal value of the receivables from counterparties (customers).

So, the Egyptian central bank proposed an equation to calculate the EAD based on forward-looking assumption as follows:

$$\begin{aligned} &= \text{The Balance of Financial Asset at The Balance Sheet Date} \\ &+ (\text{The Undrawn Balance}) \times (\text{Credit Conversion Factor "CCF"}^3) \\ &+ (\text{The Balance of Collateral}) \times (\text{Credit Conversion Factor "CCF"}) \end{aligned}$$

² Callable Rate of Loans and Debts & Collateral for each scenario.

³ The Basel II Accord implies the use of a credit conversion factor (CCF) for revolving lines of credit, which is the ratio of the estimated additional drawn amount during the period up to 12 months before default over the undrawn amount at the time of estimation. Example: Debit. Current account "Over Draft" & Discounting Bills & Letter of guarantee as those are future contracts between the entity and customer were entity cannot cancel those contracts so the balance of those items should be subject to EAD by multiplying by CCF factor. Assume you are allowed to draw a credit of 1000 Euros of which you already got 200 Euros from your entity last month. In other words, you can still obtain 800 Euros in the current month. If you today get another credit of 500 Euros, the CCF is 500 Euros divided by 800 Euros, which evaluates to 62.5 %. (Source Wikipedia).

+Accrued Return of the Financial Asset at The Balance Sheet Date (4)

After that, the auditor can develop his independent point estimate related to ECL depending on his predictions on **PD sn %** values for each scenario based on the regression model along together with the other variables of **ECL** which are **LGD sn** using minimum rate or by calculating 3 values based on the same previously scenarios of PDs% with EAD value calculated. As such the auditor could develop 3 independent points estimate related to “**ECL sn**” based on the 3 scenarios by using the following multilinear regression model:

$$\mathbf{ECL\ sn = \beta_0 + \beta_1\ PD\ sn\ \% + \beta_2\ LGD\ sn + \beta_3\ EAD} \quad (5)$$

It should also be mentioned that the predicted ECL is a Weighted Average of 3 values weighted by the likely hood of the occurrence of each scenario, so the final predicted value of ECL could be calculated as follows:

$$\mathbf{ECLWA = \sum ECL\ sn \times Sn\%} \quad (6)$$

Finally, the auditor compares his point estimate with the management to determine the degree of precision of the estimate in order to measure the objective element of the uncertainty of ECL estimate by using ratio analysis technique through the following formula:

$$\mathbf{Variance\ Rate\ of\ ECL = \frac{ECL\ mgt - ECL\ auditor}{Ecl\ mgt} \times 100\%} \quad (7)$$

$$\mathbf{Precision\ Rate/objectivity\ ECL\ uncertainty\ element = 1 - Variance\ Rate} \quad (8)$$

As the value of this formula approaches to 100% mean the estimate is more precise and therefore the more objective element of uncertainty of the estimated.

3.2 Perform audit procedures for determining the degree management bias of ECL estimates/model subjective element of uncertainty "based on predictive analytics approach":

The auditor shall evaluate whether judgments and decisions made by management in making the accounting estimates included in the financial statements, even if they are individually reasonable, are indicators of possible management bias. When indicators of possible management bias are identified, the auditor shall evaluate the implications for the audit. Where there is an intention to mislead, management bias is fraudulent in nature These indicators could be summarized as follows (IAASB, 2018):

- 1- The Value of point ECL estimate favorable for management objectives.
- 2- The number of misstatements in the financial statement in the previous audits related to ECL, especially if it arises from fraudulent financial reporting.
- 3- Variation of the value of ECL point estimate in the interim reporting compared with the annual one.
- 4- Variation of the Quantity of the related disclosures of the ECL point estimate in the interim reporting compared with the annual one.

After the auditor had determined the indicators that measure the level of management bias. The auditor could use one of the effective audit data analytics techniques which is the logistic regression model⁴. these indicators could be summarized in variables in the model as shown in the following table:

Table (3) show the variables to measure management Bias of ECL

Indicator of Management Bias	Variable of Management Bias logistic regression model	How to Measure indicator
Favourable ECL point estimate to management objectives	FECL	Increase or Decrease of the Value of ECL provision compared to the benchmark or the Peers without support valid business reason.
Credit risk amendments that result in shifting between stages of ECL	CR	Increase or Decrease credit risk without support valid business reason.
Fraudulent Misstatement from previous audit	FMISST	The ratio of fraudulent misstatements found in the previous audit (ratio of fraudulent misstatements to total misstatements)
Variation of the value of ECL point estimate during the year	VECL	Number of altering the value of ECL in interim reporting compared to annual one (changes during the quarters of the year)
Variation of the Quantity of the related disclosures of the ECL point estimate during the year	VDECL	Number of altering the level of disclosures related to ECL in interim reporting (change quantitative disclosures during years quarters)
overriding internal control over data source or assumption or the information system	ICR	Increase the value of control risk.

Source: Researcher

⁴In statistics, the logistic model (or logit model) is used to model the probability of a certain class or event existing such as pass/fail, win/lose, alive/dead, or healthy/sick. Probability between 0 and 1

This model provides a linear combination of independent variables that makes it possible to estimate the likelihood of **management bias (not bias/ bias)**.

The model could be constructed as follows:

$$\text{Mgt. Bias Rate/Subjective element of ECL Uncertainty} = \log [P/1-P] = \beta_0 + \beta_1 \text{ FECL} + \beta_2 \text{ CR} + \beta_3 \text{ FMISST} + \beta_4 \text{ VECL} + \beta_5 \text{ VDECL} + \beta_6 \text{ ICR} \quad (9)$$

*Log [P/1-P] this is calculated Odds which mean Probability of occurring (bias of management marked as P) divided by Probability of not occurring (Unbiased management marked as (1-P)). In this study, I assume an equal probability of happening 2 situations so I give P=0.5

$$\text{Mgt.Objectivity Rate} = 1 - \text{Mgt.Bias Rate} \quad (10)$$

So, the value of the model range between 0 & 1 which mean varies from a very subjective with a full management bias to no bias estimate.

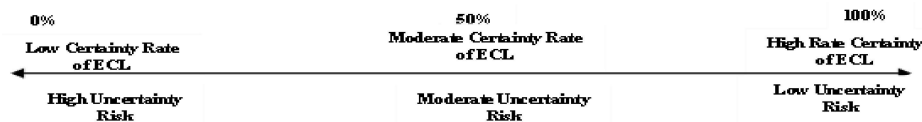
3.3 Calculating level of Uncertainty of ECL:

In the final step the auditor will identify the level of uncertainty of ECL estimates by calculating the Certainty Rate of ECL estimate based on the previous two elements of the Certainty discussed earlier which are the Precision Element and Subjective Element, then after that Calculating Uncertainty Risk as follows:

$$\text{Certainty Rate} = \text{Precision Rate} \times \text{Mgt Obj. Rate} \quad (11)$$

$$\text{Uncertainty Risk} = 1 - \text{Certainty Rate} \quad (12)$$

After the calculation of Certainty Rate for ECL estimation and related uncertainty risk of estimation, the auditor can plot this Rate on a graduated scale as follows:



Finally, the auditor makes his recommendation about those accounts or disclosures that related to ECL estimate that had been subject to further investigation in order to detect the Risk of misstatement in that account or omitting that disclosure using the association rules "If... Then "as data analytics to determine what accounts and disclosures that include that risk of misstatements

3.4 Reporting phase of auditor finding on the ECL as CAMS based on ADA (the form of report/Reporting phase of the Framework):

Audit standards require the communication of critical audit matters in the auditor's report for listed entities, The standards focused on how the new Auditor's Report, including the disclosure of critical audit matters, gives the auditor greater scope to communicate directly with users about matters relating to the ECL as CAMS. (IAASB, 2016). So based on the Descriptive – Exploratory analytics which provides a full description of the audit procedures related to auditing ECL and disclosing level of

uncertainty of the estimate as well as Prescriptive analytics to reach optimal recommendation related to auditor finding of ECL estimate and what are those accounts or disclosures related to that estimate need a further investigation for detecting any material misstatements. the following figure (2) illustrated the Proposed Form to enhance auditor Communications related to the content of ECL estimate as Critical Audit Matter as follows:

Section (A): Critical Audit Matter Description Paragraph:

In this paragraph, the auditor describes the nature of ECL provision estimate as it based on a very complex and subjective estimate with a high level of uncertainty that would require an investigation and validation of used models and assumption also the related controls with a determination of accounts and disclosures that may be affected from that significant estimate. And what are those circumstances that made it as CAMSs?

Section (B): Audit procedures that address the Critical Audit Matter Paragraph:

This paragraph depicts the audit procedures followed by the auditor to validate the estimate of the ECL estimate as follows:

- Obtaining sufficient knowledge of accounting policies used by management that related to ECL estimates.
- Sufficient knowledge of operational procedures of the internal control related to ECL estimates.
- Sufficient knowledge of factors related to the information system of ECL estimates.
- Sufficient knowledge of variables affects the estimation model of ECL estimates
- Sufficient knowledge of financial disclosures of ECL estimates
- Evaluate management choices of certain accounting Policies that could be as a sign for risk of misstatements by measuring the consistency of its application.
- Evaluate the management judgments Related to the internal control effectiveness on ECL.
- Evaluate the management judgments Related to information system effectiveness on ECL.
- Perform audit procedures for validating the degree of accuracy and consistency of the model used in calculating ECL provision (Model Precision/Objective Element of The Estimate uncertainty)
- Perform audit procedures to evaluate management bias. (Model subjective element of the estimate uncertainty).

Section (C): Auditor findings that address the Critical Audit Matter Paragraph:

In this paragraph the auditor summarizes the main and significant findings during the process of validating ECL estimate as follows:

- The auditor identifies audit issues related to the accounting policies of ECL estimates then classifies them into three categories, namely non-major, major, and critical the three classes of identified issues are according to the materiality of estimated financial impact as specified by the company's policy.
- The auditor presents his findings on the inconsistency of the application of accounting policies related to the estimates of ECLs.

- The auditor presents his findings on controls over more judgmental components of the ECL estimation process, including identification of key drivers of credit losses, the sensitivity of ECL estimation to certain inputs, the selection of forward-looking economic scenarios, and the selection of forward-looking indicators of significant increases in credit risk.
- The auditor presents his conclusion Accepting the existing model of calculating ECL or Rejecting the existing model of calculating ECL & use independent expectation by the auditor depending on the reasonableness of the management model.

Section (D): Auditor Determination of the degree of Uncertainty of the CAMS Paragraph:

In this paragraph the auditor measure degree of the Uncertainty of ECL estimate based on two elements as follows:

1-The Objectivity element of uncertainty of ECL Estimate (Precision Rate of estimate):

$$\text{Variance rate of ECL estimate} = \frac{ECL_{mgt} - ECL_{auditor}}{ECL_{mgt}} \times 100\%$$

Precision Rate = 1 - Variance Rate

As the value of this formula approaches to 100% mean the estimate is more precise and therefore the objective element of uncertainty of the estimated.

2-The Subjective element of uncertainty of ECL Estimate (Management Bias Rate):

$$\text{Mgt. Bias Rate/Subjective element of ECL Uncertainty} = \log [P/1-P] = \beta_0 + \beta_1 FECL + \beta_2 CR + \beta_3 FMISST + \beta_4 VECL + \beta_5 VDECL + \beta_6 ICR$$

Mgt. Objectivity Rate = 1 - Mgt. Bias Rate

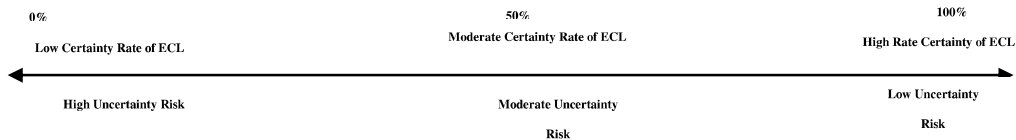
So, the value of the model range between 0 & 1 which means varies from a very subjective with a full management bias to no bias estimate".

3-The level of certainty of ECL as follows:

Certainty Rate = Precision Rate × Mgt Obj. Rate

Uncertainty Risk = 1 - Certainty Rate

After the calculation of Certainty Rate, the auditor can plot this Rate on a graduated scale to present the level of Associated Risk as follows:



Section (E) Auditor Recommendation about the CAMS Paragraph:

Finally, the auditor makes his recommendation about those accounts or disclosures that related to ECL estimate that had been subject to further investigation in order to detect the Risk of misstatement in that account or omitting that disclosure using the association rules "If... Then "as data analytics to determine what accounts and disclosures that include that risk of misstatements .

Figure (2) illustrate the proposed communication of ECL as CAMS

Source: Researcher

4. Research Hypothesis & Methodology:

The study depends on a field study through a questionnaire distributed by the researcher to academic staff members of some selected universities and the audit professionals whether the internal auditors in banks listed and controlled by the Egyptian central bank & the external auditors registered in the financial regulatory authority of the big auditing firm in Egypt with an expertise in the banking industry sector (i.e. Pwc, KPMG ,Grand Thorton ,EY) in order to test the Impact of Audit Data Analytics on auditing and Communicating ECL as CAMSs. The questionnaire was designed as a tool for collecting data for the study to test the study hypotheses, it is classified into Five main sections, The first section is concerned with Questions deals with general questions about demography of the inquirer, The second section about Questions deals with the significant importance of CAMS Communications to the financial statement user, The third section Questions deals with challenges and responsibilities imposed by the new ECL model as a CAMS item on the external auditor, The Fourth section Questions deals with how to enhance the auditor judgement on the degree of uncertainty of ECL estimates , The last section concerned with Questions deals with how to enhances the form of Communication ECL as CAMS . where each section in the questionnaire is formulated to test certain hypothesis, a copy of the questionnaire is affiliated in the Appendix, and it is worthy to note that the questionnaire was written in English and then translated in Arabic, as the study took place in Egypt, the Likert-scale has been used as a response scale with five for strongly agree and one for strongly disagree.

The study depends on Six main hypotheses arranged into the following manner:

H1: There are no significant statistical differences between the sample participants about the agreement on the importance of CAMSs Communication to the financial statement users.

H2: There are no significant statistical differences between the sample participants about the agreement on the new ECL model challenges and responsibilities on the external auditor because of its complexity and subjectivity.

H3: There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of precision rate of ECL estimates.

H4: There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative

analytics tool that measure the degree of subjectivity or management bias rate of ECL estimates.

H5:There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of certainty for the ECL estimate and the associated uncertainty risks.

H6:There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that enhances the form of Communication ECL as CAMS.

5. Results and discussion

5.1 The Study Population:

The study population that will be of interest to the researcher is the faculty staff members in Egyptian universities, The external auditors registered in the financial regulatory authority of the big auditing firm in Egypt with expertise in the banking industry sector, and the internal auditors in the internal audit department in Egyptian banks listed and controlled by Egyptian central bank, as these categories have a close relationship with the research topic. [Table \(4\)](#) shows the distribution of the study population and the number of each category/group in the population and the portion of each one compared to others.

Table (4) the distribution of the study population

Categories of Population	Frequency	Percent
The faculty staff members in Egyptian universities Cairo-Ain Shams-Helwan	195	46%
The external auditors registered in the financial regulatory authority	189	45%
The internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank	38	9%
Total	422	100%

5.2 The Study Sample:

Sample size is 201 items, and the sample size for each of the previous categories was determined by the proportional distribution method by dividing the population size for each category by the total size of the population and multiplying the result by the resulting sample size, which is 201 items. The researcher distributed 205 questionnaires according to the study sample distributed among the three study categories and 203 lists were received, and by analyzing them the valid questionnaire ready for analysis is 201 lists representing 98% of the total sample size, and this shown from the [Table \(5\)](#) as follows:

Table (5) the number of questionnaires distributed and received that are valid for statistical analysis

Categories of Population	Number of questionnaires distributed	Number of questionnaires received	Number of invalid questionnaires forms	Number of questionnaires subject to statistical analysis
The faculty staff members in Egyptian universities Cairo-Ain Shams-Helwan	94	94	1	93
The external auditors registered in the financial regulatory authority	92	91	1	90
The internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank	19	18	0	18
Total	205	203	2	201

5.3 Testing Questionnaire:

Testing the questionnaire reliability and validity, reliability refers to the degree to which the results obtained by measurement and procedure can be replicated, while validity expresses the degree to which a measurement measures what it purports to measure (Bolarinwa, 2015). In testing the reliability of the questionnaire, the researcher used Cronbach's Alpha coefficient, this coefficient varies between zero (no reliability) and one (maximum reliability); and in testing its validity, the self-validity coefficient was calculated as the square root of the reliability coefficient, Table (6) show the results of Cronbach's alpha coefficient for the reliability and self-validity for the Five Questionnaire sections and the included items under each section related to the research topic which is Developing the Role of External Auditor to Enhance the Informative Content of the Critical Audit Matter as follows:

Table (6) the reliability and self-validity for 5 questionnaire sections related to the research topic

<i>Dimensions</i> / The Questionnaire items related to the research topic which is <i>Developing the Role of External Auditor to Enhance the Informative Content of the Critical Audit Matter</i>	Number of items	Reliability coefficient (Alpha)	Validity coefficient
<i>First Dimension (A):</i> The significant importance of CAMS Communication to the financial statement users.	6	0.713	0.844
<i>Second Dimension (B):</i> The complexity and subjectivity of the ECL model &the new challenges and responsibilities imposed on the external auditor.	7	0.742	0.861
<i>Third Dimension (C):</i> The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of precision rate of ECL estimates.	10	0.725	0.851
<i>Fourth Dimension (D):</i> The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of subjectivity or management Bias of ECL estimates.	6	0.725	0.851
<i>Fifth Dimension (E):</i> The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of certainty for the ECL estimate and the associated uncertainty risks.	1	0.723	0.850
<i>Sixth Dimension (F):</i> The enhancement of the form of Communication ECL as CAMS through the proposed ADA	7	0.699	0.836

Table (6) shows The Reliability coefficient (Alpha) for First Dimension (A) of the questionnaire “The significant importance of CAMS Communication to the financial statement users” is (0.713) and Validity coefficient is (0.844), were as the Reliability coefficient (Alpha) for Second Dimension (B) of the questionnaire “The complexity and subjectivity of ECL model &the new challenges and responsibilities imposed on the external auditor” is (0.724) and Validity coefficient is (0.861), were as the Reliability coefficient (Alpha) for Third Dimension (C) of the questionnaire “The introduction of suitable audit data analytics tools will enhance the judgment of the external auditor to stand on the reasonableness of ECL estimates.” is (0.725) and

Validity coefficient is (0.851), finally the Reliability coefficient (Alpha) for Fourth Dimension (D) of the questionnaire “The enhancement of the form of Communication ECL as CAMS through the proposed ADA” is (0.699) and Validity coefficient is (0.836).Based on the previous results, it could be concluded that the study instrument is reliable and valid.

5.4 Descriptive Statistics:

The researcher extracted the descriptive statistics of the research variables - this includes the descriptive statistics of both frequencies and percentages, weighted arithmetic mean, standard deviation as follows:

5.4.1 Descriptive statistical analysis of questions related to the First hypothesis:

Table (7) shows the descriptive statistics of the responses the questionnaire that related to the First hypothesis which is “There is no significant statistical differences between the sample participants about the agreement on the importance of CAMS Communication to the financial statement users “As follows:

Table (7)the descriptive statistics of the responses on the questions related to the First hypothesis

Item	Levels [Frequency / Percent]					ME AN	Standard deviation	Rank
	Totally Disagree	Disagree	Neutral	agree	Totally agree			
Information asymmetry problem can be reduced between auditors and users of annual reports when CAMSs are disclosed in the audit report.	1	5	22	71	102	4.33	0.81	5
	0%	2%	11%	35%	51%			
The current pass/fail version of the standardized audit report has been criticized as not providing stakeholders with much information on CAMS.	2	3	25	68	103	4.33	0.82	6
	1%	1%	12%	34%	51%			
CAMS disclosures in the auditor’s report may increase investors’ confidence about assertions in the financial statements.	0	3	15	84	99	4.39	0.69	2
	0%	1%	7%	42%	49%			
Disclosing CAMSs in audit report lead managers improve the quality of their financial statement disclosures.	2	5	16	77	101	4.34	0.81	4
	1%	2%	8%	38%	50%			
There is <u>informative value enhancement effect</u> that derived	1	4	13	81	102	4.39	0.74	3
	0%	2%	6%	40%	51%			

from footnote disclosure combined with a CAMS paragraph in the audit report is compared to footnote disclosure alone.				%				
There is <u>source credibility effect</u> for the information in the CAMS paragraph as the auditor's task is to independently opine on the financial statements.	1	2	16	75	107			
	0%	1%	8%	37%	53%	4.42	0.72	1
General mean	1	4	18	77	101			
	0%	2%	9%	39%	50%	4.36	0.77	

Table (7) shows the responses of the study sample about the items related to the First hypothesis which is “There is no significant statistical differences between the sample participants about the agreement on the importance of CAMS Communication to the financial statement users”. It was found through the answers that there is a large percentage agreeing with these Items as a whole, and this shown from the general mean row, which is (50 + 39 = 89%) and 9% of the sample gave a neutral answer, while the ratio (0 + 2 = 2%) of the sample size does not agree to these Items. Also, by looking at the values of the Mean for each of the items of the question, the Items can be arranged in terms of the largest Mean as shown in the Rank column. Thus, it is clear that the majority of the sample participants agree on the Items of the Second questionnaire section that related to the First hypothesis. Where the most important one There is **source credibility effect** for the information in the CAMS paragraph as the auditor's task is to independently opine on the financial statements.

5.4.2 Descriptive statistical analysis of questions related to the Second hypothesis:

Table (8) shows the descriptive statistics of the responses the questionnaire that related to the Second hypothesis which is “There is no significant statistical differences between the sample participants about the agreement on the new ECL model challenges and responsibilities on the external auditor because of its complexity and subjectivity “As follows:

Table (8) the descriptive statistics of the responses on the questions related to the Second hypothesis

Items	Levels [Frequency / Percent]					ME AN	Standard deviation	Rank
	Totally Disagree	Disagree	Neutral	agree	Totally agree			
.The Data and assumptions of	1	5	23	80	92	4.28	0.80	7

the new credit risk model will be a challenge for auditors to determine how to address such and data of these systems in the audit process.	0%	2%	11%	40%	46%			
The use of forward-looking data and assumptions that are not directly related to the entity such as forward-looking macroeconomic information related to external event is challenging when assessing their reasonableness	2	5	16	69	109			
	1%	2%	8%	34%	54%	4.38	0.81	2
The estimation process of ECL provisions is complex, and have a high degree of subjectivity, both of which are indicators of high estimation uncertainty which lead to one or more significant risks of misstatements in financial statements items related to this estimate.	1	2	20	72	106			
	0%	1%	10%	36%	53%	4.39	0.75	1
Auditors may face different challenges in obtaining an understanding the model used in measurement of ECL such as the model soundness and mathematical integrity control policies, procedures and security controls over the model.	4	4	20	71	102			
	2%	2%	10%	35%	51%	4.31	0.88	6
The problem of Estimation Uncertainty Implicit in ECL Models Issue	1	6	18	76	100			
	0%	3%	9%	38%	50%	4.33	0.80	3
Auditor Shall review the judgments and decisions made by management in the making of accounting estimates to identify whether there are indicators of possible management bias.	1	6	23	70	101			
	0%	3%	11%	35%	50%	4.31	0.83	5
It is very important to communicate the key audit matters, with users about	2	4	22	75	98			
	1%	2%	11%	37%	49%	4.31	0.82	4

matters relating to the ECL								
General mean	2	5	20	72	102			
	1%	2%	10%	36%	51%	4.33	0.83	

Table (8) shows the responses of the study sample about the Items related to the Second hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on the new ECL model challenges and responsibilities on the external auditor because of its complexity and subjectivity” It was found through the answers that there is a large percentage agreeing with these Items as a whole, and this shown from the general mean row, which is (51+ 36 = 87%) and 10% of the sample gave a neutral answer, while the ratio (1 + 2 = 3%) of the sample size does not agree to these Items. Also, by looking at the values of the Mean for each of the Items of the question, the Items can be arranged in terms of the Largest Mean as shown in the Rank column. Thus, it is clear that the majority of the sample participants agree on the Items of the Third questionnaire section that related to the Second hypothesis. Where the most important one was the estimation process of ECL provisions is complex, and has a high degree of subjectivity, both of which are indicators of high estimation uncertainty which led to one or more significant risks of misstatements in financial statement items related to this estimate.

5.4.3. Descriptive statistical analysis of questions related to the Third hypothesis:

Table (9) shows the descriptive statistics of the responses the questionnaire questions that related to the Third hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of precision rate of ECL estimates. “As follows:

Table (9) The descriptive statistics of the responses on the questions related to the Third-hypothesis

Items	Levels [Frequency / Percent]					ME AN	Stand ard deviat ion	Ra nk
	Total ly Disag ree	Disag ree	Neut ral	ag ree	Total ly agree			
There is a degree of uncertainty related to the ECL because of its complexity and management subjectivity of that estimate.	1	2	26	74	98	4.3 2	0.77	8
	0%	1%	13%	37%	49%			
There is an inherent lack of precision of ECL estimate, referred to the <u>objective element</u> of ECL estimation uncertainty which related to the nature and reliability of information	1	2	23	67	108	4.3 9	0.77	2
	0%	1%	11%	33%	54%			

There is an inherent lack of neutrality which is a <u>subjective element</u> of ECL uncertainty that related to management bias.	0	3	18	86	94	4.3	5	0.70	5
	0%	1%	9%	43%	47%				
The accounting indicators can be used such as a decrease in the percentage of sales - operating profit - an increase in the percentage of operating risks - negative cash flows - increase in interest rates - return on assets - working capital deficit - potential liabilities - debt ratio - customer turnover - decrease in operating leverage - Decreased liquidity ratio, increased financial leverage, which are historical indicators that help in predicting the probability of default on repayment (PD%).	1	4	16	83	97	4.3	5	0.75	6
	0%	2%	8%	41%	48%				
The proposed ADA provides an appropriate quantitative tool by ratio analysis for historical accounting data represented in sales margin - profit margin - cash flow ratio from operating activities - interest rate declared by the central bank - rate of return on assets - working capital ratio - ratio Contingent liabilities to total liabilities Debt ratio – Trade receivables turnover - Operating leverage ratio - Current ratio - Financial leverage ratio Helps to provide predictive indicators of PD%	0	3	25	77	96	4.3	2	0.75	9
	0%	1%	12%	38%	48%				
The macro-economic indicators such as unemployment rate, wage growth and GDP growth can be used that express future assumptions that help in predicting the probability of defaulting on repayment (PD%).	1	3	24	70	103	4.3	5	0.78	7
	0%	1%	12%	35%	51%				

<p>The Proposed ADA provides an appropriate quantitative tool by ratio analysis for future data as indicators of the overall economy, such as unemployment rates, labour growth rate, and gross domestic product growth rate So it helps to provide predictive indicators for the PD% "probability of default".</p>	1	3	24	82	91			
	0%	1%	12%	41%	45%	4.2 9	0.77	10
<p>The proposed ADA provides an appropriate quantitative tool through multiple linear regression as a predictive model to provide an estimate of the mathematical value of PD% "default probability" as a dependent variable by linking its indicators together as independent variables.</p>	1	4	17	76	103			
	0%	2%	8%	38%	51%	4.3 7	0.76	4
<p>The proposed ADA could provide suitable equation that measure the degree of precision of management estimate with the auditor estimate through the following equations: $\text{Variance Rate} = \frac{ECL_{mgt} - ECL_{auditor}}{Ecl_{mgt}} \times 100\%$ Precision Rate= 1- Variance Rate</p>	0	3	16	71	111			
	0%	1%	8%	35%	55%	4.4 4	0.70	1
<p>The proposed ADA provides an appropriate quantitative tool through multiple linear regression as a predictive model to provide an estimate of the mathematical value of the Expected Credit Loss Allowance (ECL) as a dependent variable with its three indicators which are PD%, the loss rate at default, LGD, and credit balances on default (EAD) as independent variables.</p>	1	3	12	88	97			
	0%	1%	6%	44%	48%	4.3 8	0.71	3

General mean	1	3	20	77	100	4.3	5	0.76	
	0%	1%	10%	39%	50%				

Table (9) shows the responses of the study sample about the Items related to the Third hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of precision rate of ECL estimates“.It was found through the answers of questions that there is a large percentage agreeing with these Items as a whole, and this shown from the general mean row, which is (50+ 39 = 89%) and 10% of the sample gave a neutral answer, while the ratio (0 + 1 = 1%) of the sample size does not agree to these Items. Also, by looking at the values of the Mean for each of the paragraphs of the question, the Items can be arranged in terms of the Largest Mean as shown in the Rank column. Thus, it is clear that the majority of the sample participants agree on the items that related to the Third hypothesis. Where the most important one was the proposed ADA could provide a suitable equation that measures the degree of precision of management estimate with the auditor estimate through the following equations:

$$\text{Variance Rate} = \frac{\text{ECL mgt} - \text{ECL auditor}}{\text{Ecl mgt}} \times 100\%$$

$$\text{Precision Rate} = 1 - \text{Variance Rate}$$

5.4.4 Descriptive statistical analysis of questions related to the Fourth hypothesis:

Table (10) shows the descriptive statistics of the responses on the questions of the fourth hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of subjectivity or management bias rate of ECL estimates.“As follows:

Table (10) The descriptive statistics of the responses on the questions related to the Fourth hypothesis

Items	Levels [Frequency / Percent]					ME AN	Standard deviation	Rank
	Totally Disagree	Disagree	Neutral	agree	Totally agree			
The Existence of Favourable ECL point estimate could be indicator of management bias.	2	2	17	82	98	4.3	0.76	4
	1%	1%	8%	41%	49%			
The Existence of Fraudulent Misstatement from pervious audit could be indicator of management bias.	1	2	23	80	95	4.3	0.75	5
	0%	1%	11%	40%	47%			
The Existence of Variation	1	2	16	78	104	4.4	0.72	3

of the value of ECL point estimate during the year could be indicator of management bias.	0%	1%	8%	39%	52%	0		
The Existence of Variation of the Quantity of the related disclosures of the ECL point estimate during the year could be indicator of management bias	0	2	24	82	93			
	0%	1%	12%	41%	46%	4.3	0.72	6
The proposed ADA provides an appropriate quantitative tool by ratio analysis, to measure the indicators of management bias, such as a decrease in the provision for expected credit losses compared to peers of entities of the same industrial sector - the percentage of fraudulent misstatements revealed in the previous audit (the ratio of fraudulent misstatements to total misstatements) - the number of times of change in the value of the provision in each quarter of the year (interim) - the number of times the change in the quantitative level of disclosures each quarter of the year (interim)- Credit risk amendments that result in shifting between stages of ECL - overriding internal control over data source or assumption or the information system(Control risk)	0	5	20	64	112			
	0%	2%	10%	32%	56%	4.4	1	0.77
The ADA framework provides an appropriate	0	2	19	77	103	4.4	0.70	2

equation that measures the degree of management bias by providing a logistic regression model as this model provides a linear set of independent variables of probabilities between 0 and 1 that make it possible to estimate the probability of management bias in estimating ECL (no bias / there is bias).								
	0%	1%	9%	38%	51%			
General mean	1	2	20	77	101			
	0%	1%	10%	39%	50%	4.3	7	0.74

Table (10) shows the responses of the study sample about the Items related to the Fourth hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of subjectivity or management bias rate of ECL estimates“.It was found through the answers of questions that there is a large percentage agreeing with these Items as a whole, and this shown from the general mean row, which is (50+ 39= 89%) and 10% of the sample gave a neutral answer, while the ratio (0 + 1 = 1%) of the sample size does not agree to these Items. Also, by looking at the Mean for each of the Items of the question, the Items can be arranged in terms of Largest as shown in the Rank column. Thus, it is clear that the majority of the sample participants agree on the Items questionnaire that related to the Fourth hypothesis. Where the most important one was the proposed ADA provides an appropriate quantitative tool based on ratio analysis that measures the degree of management bias.

5.4.5 Descriptive statistical analysis of questions related to the Fifth hypothesis:

Table (11) shows the descriptive statistics of the responses to the question that related to the Fifth hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of certainty for the ECL estimate and the associated uncertainty risks. “As follows:

Table (11) The descriptive statistics of the responses on the questions related to the Fifth hypothesis:

Items	Levels [Frequency / Percent]					ME AN	Standard deviation	Rank
	Totally Disagree	Disagree	Neutral	agree	Totally agree			
The proposed ADA provides suitable Quantitative measurement of Uncertainty of ECL estimate through the following equations: Certainty Rate = Precision Rate × Mgt objectivity Rate Uncertainty Risk = 1 - Certainty Rate	1	2	11	71	116			
	0%	1%	5%	36%	58%	4.49	0.69	-

Table (11) shows the responses of the study sample about the Item related to the to the Fifth hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of certainty for the ECL estimate and the associated uncertainty risks “.It was found through the answers of sample participants that there is a large percentage agreeing with the item as a whole, and this shown from the general mean row, which is (58+ 36= 94%) and 5% of the sample gave a neutral answer, while the ratio (0 + 1 = 1%) of the sample size does not agree to that item. Thus, it is clear that the majority of the sample participants agree on thatthe item of the questionthat related to the Fifth hypothesis, where about 94% agreed on that paragraphwhich is how the proposed ADA provides suitable Quantitative measurement of Uncertainty of ECL estimate through the following equations:

$$\text{Certainty Rate} = \text{Precision Rate} \times \text{Mgt. objectivity Rate}$$

$$\text{Uncertainty Risk} = 1 - \text{Certainty Rate}$$

5.4.6 Descriptive statistical analysis of questions related to the Sixth hypothesis:

Table (12) shows the descriptive statistics of the responses to the questions of the questionnaire that related to the Sixth hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that enhances the form of Communication ECL as CAMS. “as follows:

Table (12) the descriptive statistics of the responses on the questions related to the Six

Items	Levels [Frequency / Percent]					ME AN	Standard deviation	Rank
	Totally Disagree	Disagree	Neutral	agree	Totally agree			
When communicating ECL as CAMS item the Audit procedures followed by the auditor to validate the estimate of the ECL estimate should be described in suitable way.	0	2	22	75	102	4.38	0.72	3
	0%	1%	11%	37%	51%			
When communicating ECL as CAMS item auditor must summarizes the main and significant findings during the process of validating ECL estimate in suitable way	0	4	21	74	102	4.36	0.75	6
	0%	2%	10%	37%	51%			
When communicating ECL as CAMS item auditor should provide a qualitative or quantitative description of the level or degree of estimation uncertainty of the ECL in suitable way.	0	3	11	75	112	4.47	0.67	1
	0%	1%	5%	37%	56%			
When communicating ECL as CAMS item auditor should provide a description of what matters were most significant to the auditor with regards to the ECL in suitable way.	0	2	23	78	98	4.35	0.72	7
	0%	1%	11%	39%	49%			
When communicating ECL as CAMS item auditor should provide information about the precision rate of the estimate in suitable quantitative way	0	2	21	73	105	4.40	0.71	2
	0%	1%	10%	36%	52%			
When communicating ECL as CAMS item auditor should provide information	1	3	18	80	99	4.36	0.75	5
	0%	1%	9%	40%	49%			

about the risk of management bias related to the estimate suitable quantitative way.								
When communicating ECL as CAMS item the risk of uncertainty for the arithmetic value related to the estimate in should be addressed in suitable quantitative way.	1	1	23	71	105			
	0%	0%	11%	35%	52%	4.38	0.74	4
General mean	0	2	20	75	104			
	0%	1%	10%	37%	52%	4.40	0.71	

Table (12) shows the responses of the study sample about the Items related to the Sixth hypothesis which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that enhances the form of Communication ECL as CAMS”. It was found through the answers that there is a large percentage agreeing with these Items as a whole, and this shown from the general mean row, which is (52+ 37 = 89%) and 10% of the sample gave a neutral answer, while the ratio (0 + 1 = 1%) of the sample size does not agree to these Items. Also, by looking at the values of the Mean for each of the Items of the question, the Items can be arranged in terms of the Largest Mean as shown in the Rank column. Thus, it is clear that the majority of the sample participants agree on the Items of the Sixth questionnaire that related to the Sixth hypothesis. Where the most important one when communicating ECL as CAMS item the auditor should provide a qualitative or quantitative description of the level or degree of estimation uncertainty of the ECL in a suitable way

5.5 Hypothesis Tests:

Using T-Test for the test of accepting or rejecting the study Hypotheses We test the validity & Acceptance of each of the Six hypotheses, by testing that the average opinion of each dimension is greater than 3 for the whole sample, and the test results were as follows:

5.5.1 T-Test Results for the First Hypothesis:

Table (13) shows the result of the T-test of the First Hypothesis “There are no significant statistical differences between the sample participants about the agreement on the importance of CAMSs Communication to the financial statement users. “as follows:

Table (13) T-Test of the first Hypothesis

Dimension	Mean	Std. Deviation	T. test	
			t	Sig
The significant importance of CAMS Communication to the financial statement users. (DA)	4.3600	0.7700	25.04	0.000

Table (13) shows that the mean value of the First dimension (A) is 4.36 which is greater than 3 & the significance level is Sig = 0.000 is less than 5%. This means that the Participants in the entire sample agreed on the Acceptance of the First dimension (A) which is “*The significant importance of CAMS Communication to the financial statement users*”. Because the average opinion is greater than 3. Thus, it is concluded that the first hypothesis (H1) is accepted which is “*There are no significant statistical differences between the sample participants about the agreement on the importance of CAMS Communication to the financial statement users*”.

5.5.2 T-Test Results for the Second Hypothesis:

Table (14) shows the result of the T-test of the Second Hypothesis which is “*There is no significant statistical differences between the sample participants about the agreement on the new ECL model challenges and responsibilities on the external auditor because of its complexity and subjectivity*” as follows:

Table (14) T-Test of Second Hypothesis

Dimension	Mean	Std. Deviation	T. test	
			t	Sig
The complexity and subjectivity of ECL model & the new challenges and responsibilities imposed on the external auditor (DB)	4.3300	0.8300	22.72	0.000

Table (14) shows that the mean value of the Second dimension (B) is 4.33 which is greater than 3 & the significance level is Sig = 0.000 is less than 5%. This means that the Participants in the entire sample agreed on the Acceptance of the Second dimension (B) which is “*The complexity and subjectivity of ECL model & the new challenges and responsibilities imposed on the external auditor*”. Because the average opinion is greater than 3. Thus, it is concluded that the Second hypothesis is accepted (H2) which is “*There are no significant statistical differences between the sample participants about the agreement on the new ECL model challenges and responsibilities on the external auditor because of its complexity and subjectivity*”.

5.5.3 T-Test Results for the Third Hypothesis:

Table (15) shows the result of the T-test of the Third Hypothesis Which is “*There are no significant statistical differences between the sample participants about the*

agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of precision rate of ECL estimates” as follows:

Table (15)T-Test for the Third Hypothesis

Dimension	Mean	Std. Deviation	T. test	
			t	Sig
The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of precision rate of ECL estimates(DC)	4.3700	0.7900	24.59	0.000

Table (15) shows that the mean value of the Third dimension (C) is 4.37 which is greater than 3 & the significance level is Sig = 0.000 is less than 5%. This means that the Participants in the entire sample agreed on the Acceptance of the Third dimension (C) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of precision rate of ECL estimates”. Because the average opinion is greater than 3. Thus, it is concluded that the Third hypothesis is accepted (H3) which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of precision rate of ECL estimates“.

5.5.4 T-Test Results for the Fourth Hypothesis:

Table (16) shows the result of the T-test of the Fourth Hypothesis “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of subjectivity or management bias rate of ECL estimates.” as follows:

Table (16) T-Test of the Whole sample for the Fourth Hypothesis

Dimension	Mean	Std. Deviation	T. test	
			t	Sig
The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of subjectivity or management Bias of ECL estimates(DD)	4.3800	0.7500	26.09	0.000

Table (16) shows that the mean value of the Fourth dimension (D) is 4.38 which is greater than 3 & the significance level is Sig = 0.000 is less than 5%. This means

that the Participants in the entire sample agreed on the Acceptance of the Fourth dimension (D) which is *“The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of subjectivity or management Bias of ECL estimates”*. Because the average opinion is greater than 3. Thus, it is concluded that the Fourth hypothesis is accepted (H4) which is *“There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of subjectivity or management bias rate of ECL estimates”*.

5.5.5 T-Test Results for the Fifth Hypothesis:

Table (17) shows the result of the T-test of the Fifth Hypothesis *“There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of certainty for the ECL estimate and the associated uncertainty risks.”* as follows:

Table (17) T-Test of the Whole sample for the Fifth Hypothesis

Dimension	Mea n	Std. Deviatio n	T. test	
			t	Sig
The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of certainty for the ECL estimate and the associated uncertainty risks. (DE)	4.50 00	0.7200	25.0 9	0.000

Table (17) shows that the mean value of the Fourth dimension (D) is 4.5 which is greater than 3 & the significance level is Sig = 0.000 is less than 5%. This means that the Participants in the entire sample agreed on the Acceptance of the Fifth dimension (E) which is *“The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of certainty for the ECL estimate and the associated uncertainty risks.”*. Because the average opinion is greater than 3. Thus, it is concluded that the Fifth hypothesis is accepted (H5) which is *“There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that measure the degree of certainty for the ECL estimate and the associated uncertainty risks.”*

5.5.6 T-Test Results for the Sixth Hypothesis:

Table (18) shows the result of the T-test of the Fifth Hypothesis *“There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that enhances the form of Communication ECL as CAMS.”* as follows:

Table (18) T-Test of Sixth Hypothesis

Dimension	Mean	Std. Deviation	T. test	
			t	Sig
The enhancement of the form of Communication ECL as CAMS through the proposed ADA (DF)	4.4000	0.7100	27.96	0.000

Table (18) shows that the mean value of the Sixth dimension (F) is 4.4 which is greater than 3 & the significance level is Sig = 0.000 is less than 5%. This means that the Participants in the entire sample agreed on the Acceptance of the Sixth dimension (F) which is “The enhancement of the form of Communication ECL as CAMS through the proposed ADA.” because the average opinion is greater than 3. Thus, it is concluded that the Sixth hypothesis is accepted (H6) which is “There are no significant statistical differences between the sample participants about the agreement on how the proposed ADA introduces a suitable quantitative analytics tool that enhances the form of Communication ECL as CAMS.”.

5.6 One-way ANOVA Test:

Test To find out whether there is a significant difference in the average opinions between the categories **(Career Position /Experience/Education)** that make up the sample items as follows:

5.6.1 One-way ANOVA Test To find out whether there is a significant difference in the average opinions between the categories that make up the sample Participants according to **The Career position variable** about the agreement regarding each of the study dimension: Table (19) shows the One-way ANOVA Test for each dimension of the study dimensions according to the Career position Variable as follows:

Table (19) One-way ANOVA Test for each Dimension according to the Career position Variable

Dimensions	MEAN			F. test	
	a1	a2	a3	F	Sig
A	4.34	4.40	4.34	.658	.519
B	4.31	4.33	4.43	.843	.432
C	4.37	4.39	4.29	.540	.583
D	4.38	4.35	4.40	.856	.427
E	4.38	4.41	4.33	.645	.526
F	4.36	4.42	4.28	.700	.570

Where (a1, a2, a3) Express the Career Position as follows:

a1: The faculty staff members in Egyptian universities

a2: The external auditors registered in the financial regulatory authority

a3: The internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank

From the One-way ANOVA Test analysis of table (19) we found the following:

- For the First Dimension (A) which is “The significant importance of CAMS Communication to the financial statement users”:

The value of the significance level is $\text{sig} = 0.519$ greater than 5%. This means that there are no significant differences between the average opinions of each of the three categories according to the career position variable. This means that the faculty staff members in Egyptian universities (Cairo/Ain-Shams/Helwan), The external auditors registered in the financial regulatory authority, and the internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank all agreed regarding the First dimension, A.

- For the Second Dimension (B) which is “The complexity and subjectivity of ECL model & The new challenges and responsibilities imposed on the external auditor.”

The value of the significance level is $\text{sig} = 0.432$ greater than 5%. This means that there are no significant differences between the average opinions of each of the three categories according to the career position variable. This means that the faculty staff members in Egyptian universities (Cairo/Ain-Shams/Helwan), the external auditors registered in the financial regulatory authority and the internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank all agreed Regarding the Second Dimension, B.

- For the Third Dimension (C) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of precision rate of ECL estimates”:

The value of the significance level is $\text{sig} = 0.583$ greater than 5%. This means that there are no significant differences between the average opinions of each of the three categories according to the career position variable. This means that the faculty staff members in Egyptian universities (Cairo/Ain-Shams/Helwan), the external auditors registered in the financial regulatory authority and the internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank all agreed Regarding the Third Dimension, C.

- For the Fourth Dimension (D) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of subjectivity or management Bias of ECL estimates”:

The value of the significance level is $\text{sig} = 0.427$ greater than 5%. This means that there are no significant differences between the average opinions of each of the three categories according to the career position variable. This means that the faculty staff members in Egyptian universities (Cairo/Ain-Shams/Helwan), the external auditors registered in the financial regulatory authority, and the internal auditors in the internal audit department in Egyptian banks listed and controlled by Egyptian central all agreed Regarding Fourth Dimension, D.

- For the Fifth Dimension (E) which is *“The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of certainty for the ECL estimate and the associated uncertainty risks.”*:

The value of the significance level is sig = 0.526 greater than 5%. This means that there are no significant differences between the average opinions of each of the three categories according to the career position variable. This means that the faculty staff members in Egyptian universities (Cairo/Ain-Shams/Helwan), the external auditors registered in the financial regulatory authority and the internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank all agreed Regarding the Fifth Dimension, E.

- For the Sixth Dimension (F) which is *“The enhancement of the form of Communication ECL as CAMS through the proposed ADA.”*:

The value of the significance level is sig = 0.570 greater than 5%. This means that there are no significant differences between the average opinions of each of the three categories according to the career position variable. This means that the faculty staff members in Egyptian universities (Cairo/Ain-Shams/Helwan), the external auditors registered in the financial regulatory authority and the internal auditors in the internal audit department in Egyptian banks listed and controlled by the Egyptian central bank all agreed Regarding the Fifth Dimension, F.

5.6.2 One-way ANOVA Test To find out whether there is a significant difference in the average opinions between the categories that make up the sample Participants according to *the Professional Experience variable* about the agreement regarding each of the study dimension:

Table (20) shows the One-way ANOVA Test for each dimension of the study dimensions according to the Professional Experience Variable as follows:

Table (20) One-way ANOVA Test for each Dimension according to the Professional Experience Variable

Dimensions	MEAN				F. test	
	b1	b2	b3	b4	F	Sig
A	4.33	4.33	4.42	4.40	.830	.479
B	4.29	4.45	4.33	4.29	2.366	.072
C	4.37	4.39	4.35	4.37	.081	.970
D	4.39	4.35	4.38	4.36	.511	.675
E	4.33	4.43	4.42	4.39	1.303	.275
F	4.37	4.36	4.38	4.32	1.532	0.355

Where (b1, b2, b3, b4) Express the Professional Experience as follows:

b1: Less than 5 years.

b2: From 5 to 10.

b3: From 10 to 15.

b4: above 15 years

From the One-way ANOVA Test analysis of table (6.22) we found the following:

- For the First Dimension (A) which is “The significant importance of CAMS Communication to the financial statement users”:
The value of the significance level is $\text{sig} = 0.479$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Professional Experience variable. This means that the professionals that have professional expertise less than 5 years, the participants that have professional expertise between 5 & 10 years the professionals that have professional expertise between 10 & 15 years & the professionals that have professional expertise of more than 15 years all agreed regarding the First dimension, A.
- For the Second Dimension (B) which is “The complexity and subjectivity of ECL model & The new challenges and responsibilities imposed on the external auditor.”
The value of the significance level is $\text{sig} = 0.072$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Professional Experience variable. This means that the participants that have professional expertise less than 5 years, the professionals that have professional expertise between 5 & 10 years the professionals that have professional expertise between 10 & 15 years & the professionals that have professional expertise of more than 15 years all agreed Regarding the Second Dimension, B.
- For the Third Dimension (C) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of precision rate of ECL estimates”:
The value of the significance level is $\text{sig} = 0.970$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Professional Experience variable. This means that the participants that have professional expertise less than 5 years, the professionals that have professional expertise between 5 & 10 years the professionals that have professional expertise between 10 & 15 years & the professionals that have professional expertise of more than 15 years all agreed Regarding the Third Dimension, C.
- For the Fourth Dimension (D) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of subjectivity or management Bias of ECL estimates”:
The value of the significance level is $\text{sig} = 0.675$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Professional Experience variable. This means that the participants that have professional expertise less than 5 years, the professionals that have professional expertise between 5 & 10 years the professionals that have

professional expertise between 10 &15 years & the professionals that have professional expertise of more than 15 years all agreed Regarding Fourth Dimension, D.

- For the Fifth Dimension (E) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of certainty for the ECL estimate and the associated uncertainty risks.”:

The value of the significance level is sig = 0.275 greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Professional Experience variable. This means that the participants that have professional expertise less than 5 years, the professionals that have professional expertise between 5 &10 years the professionals that have professional expertise between 10 &15 years & the professionals that have professional expertise of more than 15 years all agreed Regarding the Fifth Dimension, E.

- For the Sixth Dimension (F) which is “The enhancement of the form of Communication ECL as CAMS through the proposed ADA.”:

The value of the significance level is sig = 0.355 greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Professional Experience variable. This means that the participants that have professional expertise less than 5 years, the professionals that have professional expertise between 5 &10 years the professionals that have professional expertise between 10 &15 years & the professionals that have professional expertise of more than 15 years all agreed Regarding the Sixth Dimension, F

5.6.3 One-way ANOVA Test To find out whether there is a significant difference in the average opinions between the categories that make up the sample Participants according to the Education variable about the agreement regarding each of the study dimensions:

Table (21) shows the One-way ANOVA Test for each dimension of the study dimensions according to the Education Variable as follows:

Table (21) One-way ANOVA Test for each Dimension according to the Education Variable

Dimensions	MEAN				F. test	
	c1	c2	c3	c4	F	Sig
A	4.42	4.35	4.31	4.42	1.150	.330
B	4.29	4.32	4.30	4.39	.916	.434
C	4.41	4.34	4.36	4.40	.395	.757
D	4.32	4.38	4.40	4.34	1.599	.191
E	4.47	4.37	4.38	4.37	.910	.437
F	4.25	4.36	4.41	4.38	.955	.621

Where (c1, c2, c3, c4) Express the Education as follows:

c1: Bachelor.

c2: Diploma.

c3: Master.

c4: Ph.D.

From the One-way ANOVA Test analysis of [table \(21\)](#) we found the following:

- For the First Dimension (A) which is “The significant importance of CAMS Communication to the financial statement users”:
The value of the significance level is $\text{sig} = 0.330$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Education variable. This means that the participants who carry Bachelor's, the participants who carry Diploma, the participants who carry Masters & the participants who carry Ph.D. all agreed regarding the First dimension, A.
- For the Second Dimension (B) which is “The complexity and subjectivity of ECL model & The new challenges and responsibilities imposed on the external auditor.”
The value of the significance level is $\text{sig} = 0.434$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Education variable. This means that the participants who carry Bachelor's, the participants who carry Diploma, the participants who carry Masters & the participants who carry Ph.D. all agreed Regarding the Second Dimension, B.
- For the Third Dimension (C) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of precision rate of ECL estimates”:
The value of the significance level is $\text{sig} = 0.757$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Education variable. This means that the participants who carry Bachelor's, the participants who carry Diploma, the participants who carry Masters & the participants who carry Ph.D. all agreed Regarding the Third Dimension, C.
- For the Fourth Dimension (D) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of subjectivity or management Bias of ECL estimates”:
The value of the significance level is $\text{sig} = 0.191$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Education variable. This means that the participants who carry Bachelor, the participants who carry Diploma, the participants who carry Masters & the participants who carry Ph.D. all agreed Regarding Fourth Dimension, D.
- For the Fifth Dimension (E) which is “The introduction of suitable audit proposed Audit data analytics tools will improve the judgment of the external auditor measurement for the degree of certainty for the ECL estimate and the associated uncertainty risks.”:

The value of the significance level is $\text{sig} = 0.473$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Education variable. This means that the participants who carry Bachelor's, the participants who carry Diploma, the participants who carry Masters & the participants who carry Ph.D. all agreed Regarding Fourth Dimension, E.

➤ For the Sixth Dimension (F) which is "*The enhancement of the form of Communication ECL as CAMS through the proposed ADA.*":

The value of the significance level is $\text{sig} = 0.621$ greater than 5%. This means that there are no significant differences between the average opinions of each of the four categories according to the Education variable. This means that the participants who carry Bachelor's, the participants who carry Diploma, the participants who carry Masters & the participants who carry Ph.D. all agreed Regarding Fourth Dimension, E

6. Conclusions & Research Limitation & Future research:

The findings of the study show the significant importance of ECL i.e., CAMS Communication to the financial statement users as it promotes the user to the audit report and finally improves the understanding and relevance of the related financial statements. Thus, When the CAMS disclosures in the audit report are provide, investors may be more confident that the auditors have determined and appropriately addressed the most highly risky assertions in the financial statements which reflect on the audit quality. *Some important conclusions could be summarized as follows:*

- 1- The effective communication of the auditor findings about the audit of ECL estimation is crucial element of the result of the whole audit of ECL so the auditor should present these findings and recommendations in a suitable understandable way to the users as it represent the output of the whole audit process and very significance for the user decisions.
- 2- Management resist to increase the level of Disclosure for the subject of the CAMS due to a shift in its incentives and bias.
- 3- Auditors when audit ECL estimates i.e., CAMSs should make additional investigation on the related high-risk accounts and transactions which in order to detect any misstatement in financial statements due to fraud or error.
- 4- The significance of reporting the auditor findings of ECL estimation of Uncertainty should better be reported in the standard audit report as to give the user of financial statement the full picture of the financial statement audit.
- 5- Auditor should have a sufficient understand of Data and assumptions of the new credit risk model which is Expected credit loss model "ECL" as it is a crucial input element to assess the reasonableness of the estimate.
- 6- Auditor should have a sufficient understand of forward-looking data and assumptions that are not directly related to the entity such as forward-looking macroeconomic information related to external events and the related scenarios which will help them to project their estimate about the ECL.

The current study has some limitations. First, the study deals with not all CAMSs but what is related to ECLs estimate. Second, the study focuses on the two elements of the uncertainty of ECL estimate which are precision element for the ECL estimate to measure its complexity and management bias as an element of the subjectivity of the model calculation not all the foundational elements of ECL estimate. Third, the model introduced in the framework used to measure ECL model estimate creditability using point estimate, not range of estimate test. Fourth, the hypotheses of the study are tested using questionnaire not applied study based in real data, these due to reasons related to the data availability in the Egyptian community which was one of the boundaries or factors that affect the application of the proposed framework using actual data. Also, the questionnaire is translated to Arabic to be easily understand but this translation might affect the tests of hypotheses and the result of the field study.

At the end of the study the research may recommend for further investigations for the following uncover points:

- 1- Applying the other proposed tools of the current proposed framework in assessing the reasonableness of ECL estimate other than multi-linear regression and logistic regression and the ratio analysis.
- 2- Using the neural networks in assessing the reasonableness of ECL assumptions.
- 3- Proposing a suitable audit analytics techniques which assist the external auditor to arrive at the most reasonable *range* of estimates of ECL.
- 4- Perform an applied study based on real data to test the significance of the proposed model to enhance the informative content of CAMS .

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