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ANALYSIS OF INTERNAL FACTORS AFFECTING THE EFFECTIVENESS OF INTERNAL AUDIT FUNCTIONS: EMPIRICAL FINDINGS FROM MOROCCAN PRIVATE COMPANIES

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ABSTRACT

This research tried to analyze the determinants that impact the effectiveness of internal audit in Moroccan private companies. Five hypotheses were formulated based on a deep review of existing literature. The research used primary data collected through a questionnaire technique. A cross-sectional design technique was used with a purposive sampling approach, and structured questionnaires were used for data collection, with a total of 623 questionnaires being shared with internal auditors working in 473 private companies. A total of 567 were received, providing a feedback rate of 91%. Analyzing data was performed using structural equation modeling. The outcomes of this study show a strong positive impact of the independence, the competence of auditors, the support from top management and the use of ERP by IA persons on the effectiveness of IA. However, the size of IA team regarding internal audit tasks is not significant on the effectiveness of IA. This study has a few theoretical and potential implications concerning financial matters including IA effectiveness in Moroccan private companies. This study contributes to exploring three new aspects in relation to existing literature. The first contribution is related to the fact that most of the previous studies have emphasized the determinants of IA effectiveness in Moroccan public administration; our study adds a new relevant piece of evidence about IA effectiveness on the Moroccan private sector. The second is related to the extension of scope, including all types of firms. The third is related to the novelty of this research in discovering the effect of digital systems adoption by private companies in promoting the IA effectiveness.

KEYWORDS: Internal Audit, Effectiveness, Companies, ERP, Morocco.

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1. INTRODUCTION

In the Moroccan economy, the private sector is a core part of the hall economy, significantly adding value to its growth and maintaining investment dynamics in an economy worth over 130 billion USD (HCP, 2024). Besides being a key player in creating employment, foreign trade progress, investment attraction and shaping the business climate, private companies are actively engaging with regional economic development, innovation, service transformation and value chain evolution (AMDIE, 2022). In addition, the Casablanca Stock Exchange is currently home to over 84 stocks with a majority of private companies. However, Moroccan economy has faced a series of challenges within the past few years, with fraud cases, improper accounting and conversion of companies property being among those of serious concern (Trancparency Morocco, 2025), As reported by the World Economic Forum 2020 global competitiveness report, institutional reliability and transparency scores among Moroccan businesses were noted to be 52.3 out of 100, with emphasis on the need for better control within privately owned business entities.

The financial soundness and reputation of many Moroccan corporations have suffered significantly due to cases of embezzlement, financial statement misrepresentations and fraud committed by top executives. Today, the internal audit departments, just like external auditors, face immense pressure regarding their inability to stop the financial frauds or sound the warning bells about financial irregularities. A currently prevailing example is a Moroccan heavy private company involving an act of embezzlement due to weak control mechanisms.

Furthermore, considering the increasingly high risks related to operations, technology and finances, especially within a heavily digitized environment, ensuring the optimal protection of data and information systems is a must for companies. In this respect, internal auditing is a fundamental piece to ensuring the protection of information against mismanagement, high risk behavior and fraudulent actions. As cited by (Boghean & Chihai, 2021), the role of internal auditors is significant within a firm's capacity to achieve its objectives and protect its assets. As stated by the IPPF, the internal audit activity makes an important contribution to good governance, efficient risk management and effective control frameworks. Moreover, (Sarac & al., 2023) argue that a value creating internal audit activity in one in which organizations maximize the use of the capabilities of this activity.

As a result, the performance of internal auditors has received broad international academic attention (Silva & al., 2023). Yet, in the Moroccan context, most academic research has concentrated on the determinants of the effectiveness of external auditors of publicly listed firms and banking institutions (Kotbi & Achour, 2024). There is an insufficiency of academic research concerning the effectiveness of IA in private sector in digital area, with most existing studies being carried out in the fields of internal auditing in bank, corporate governance and financial information quality (Benazzou & Nouaje, 2022). However, given the recent financial scandals, management weaknesses, and changing requirements of the regulations, there is an obvious need to ensure the effectiveness of IA in Moroccan private firms by identifying the respective determinants of the process in digital context.

1.1. Resource-Based Theory and Internal Audit Effectiveness

Resource-based theory constitutes the theoretical framework from which the correlation between the exogenous and endogenous factors treated in this analysis can be viewed. The RBT theory contends that every organization has its own distinct characteristics in terms of competency and that both material and intangible resources need to be developed and nurtured over time in order to gain sustained competitive advantage (Ahmed & Che-ahmad, 2016). Understood as postulated by (Barney & al. 2001), resources refer to all direct or indirect factors or pieces of knowledge, organizational characteristics, skills and information at the disposal of the organization to gain competitive advantage through efficiency and effectiveness. In cases, where an organization has strong internal resources or unique capabilities, the organization can use strategies that result in significant improvement of organizational performance. Notably, the RBT theory underscores the role of internal organizational factors such as human capital, technology, governance structure and control mechanisms in enhancing IA effectiveness across organizations.

As a conclusion, the present study applies resource-based theory to understand the impact of internal resources in determining the effectiveness of the IA in private Moroccan companies, in which organizational performance has increasingly come to rely upon the strength of its control systems, human capital and management capabilities.

1.2. Internal Audit Effectiveness and Private Companies

The level of internal control in private companies

has assumed greater attention and importance in recent years given the trends towards increased global competition, complexity in financial transactions, and concern toward internal fraud. As (Sulub & al., 2018) state that regulatory and professional bodies have long espoused such internal control environments and good management so as to enhance the internal accountability and efficiency.

There are a lot of studies which have examined the determinants of IA effectiveness in various organizational environment. For example, (Moutie & Benazzou, 2025) examined the effectiveness of IA and how it influences corporate governance by variables like independence, competence, size of IA team, support from top management and ERP adoption. In another Moroccan study, (Ed-douadi & Bakour, 2021), found as well that the factors of competency, and independence are important determinants of the IA function efficiency in Morocco. Furthermore (Abdelrahim & Al-Malkawi, 2022) noted that competence, IA size and top management support have impact IA effectiveness based on reliability and quality of internal work. Secondly, (Boumeska & Allouli, 2024) add that any usage of modern technologies tools such as the ERP are big factors which positively influence IA effectiveness.

Building on the foundation provided by the existing literature, in this study the effectiveness of IAs was considered with five key variables each of which will be discussed in detail within the next sections.

1.3. Independence Of Internal Auditors and Effectiveness Of IA

Independence of auditors has always been recognized as one of the core elements of IA profession and considered as one of the major factors affecting IA activity. According to several studies, the level of independence of internal auditors represents a crucial factor in organizational performance. (Mustari & al., 2020) argued that auditor independence represents the fundamental factor underpinning IA effectiveness. Furthermore, (Rakipi & al., 2021) has also substantiated as necessary to guarantee the independence for the purpose of enhancing IA effectiveness. Independence in internal auditing can thus be enhanced through unrestricted communication and reporting channels between audit executives and management as well as the governing boards. It also requires independence on IA from other departments, where auditors are not affected by any influences from the other side (Haeridistia & Fadjarenie, 2019).

After analyzing earlier research and studies, it can be concluded that:

H1: Internal auditors' independence is likely to enhance IA effectiveness of private companies.

1.4. Competence Of Internal Auditors and Effectiveness Of IA

Competence of auditors is widely recognized as an important factor affecting the effectiveness of internal auditing. (IIA, 2017), confirm that internal auditors should have the skills, expertise and abilities to fulfil their duties, supported by continuous training to maintain professional proficiency. Consistent with these guidelines, several studies highlight competence and experience as major determinants of IA effectiveness. In the same idea (Oyewumi & al., 2023) argue that auditors' technical capabilities directly enhance audit quality. Other research identifies several dimensions through which competence can be measured, including education, professional certifications, and the frequency of training received (Kai & al., 2022). Empirical findings further confirm that competence positively influences not only IA effectiveness but also on organizational outcomes.

Therefore, on the basis of the previous literature, the next hypothesis is suggested:

H2: Competence of internal auditors is likely to improve the effectiveness of the IA in private companies.

1.5. Size Of Internal Audit Team and Effectiveness Of IA

In accordance with Practice Advisory 2030-1, a sufficient auditing staff number must be employed to ensure the maintenance of professional competence (IIA, 2017). In the same vision, SANS institute conduct a study which confirm that an optimal team size of three persons is recommended to review operations and to prevent delays in the decision-making process (Moutie & Benazzou, 2025).

Furthermore, a larger IA function facilitates the rotation of internal auditors, which in turn enhances objectivity. Similarly, (Grima & al., 2023) denote that the effectiveness of the IA team is positively impacted by its size. According to all this information, we suggest the third hypothesis:

H3: The size of IA team enhances the effectiveness of the IA function

1.6. Management Support and Effectiveness Of AI

Management support is widely acknowledged as a critical determinant of IA effectiveness. Many researchers also find that lack of accountability for

financial actions and commitment at the managerial level is remaining weaknesses of IA as strong top management support can improve structures in the performance of audits. Management support ensures that internal auditors receive adequate resources, qualified personnel and the necessary authority to carry out audit plans effectively. Conversely, bureaucratic obstruction, apathy or absence of top management commitment has recognized as the main cause factors for ineffectiveness of IA (Saputra & al., 2020).

Empirical studies confirm the decisive impact of management support, proved to be the major influential factor affecting IA effectiveness, while (Zahra & al., 2023) show that positive managerial attitudes strengthen audit planning and implementation.

On the basis of the previous discussion, the hypothesis can be summarized as follows:

H4: Management support is likely to enhance the IA effectiveness in private companies.

1.7. Adoption Of ERP Systems and Effectiveness Of IA

The digital transformation literature also points out that cross-functional collaboration is very important to the successful accomplishment of outcomes in a digital world, as it lets organizations capture the potential of digital technologies (Boumeska & Allouli, 2024).

The Association of Chartered Certified Accountants asserts that technology holds the potential to reshape audit practice profoundly. In other words, the increasing use of digital tools and the growing complexity of computerized accounting systems, particularly ERP systems, have led to an exponential increase in the volume of data to be processed.

The volume of recorded electronic commerce activities, along with the necessity for financial experts and auditors to access those data that give real time indication to assist decision-making power, has led a move from classical audit techniques into computer-aided audit methods (Rouhani & al., 2018).

It is noteworthy to mention that the adoption of ERP systems has significantly improved the audit function (Silva & al., 2023). These systems improve the capability of fraud detection by auditors, speedup audit related tasks, and expedite reporting delay. Thus, given these numerous contributions, it becomes evident that ERP adoption constitutes a key determinant of IA effectiveness. Thus, we provide the next hypothesis:

H5: The adoption of ERP systems is likely to impact positively the IA effectiveness.

2. RESEARCH DESIGN

Although prior research has identified several determinants of internal audit (IA) effectiveness, the existing evidence remains largely fragmented, with most studies examining these factors in isolation and within varying organizational contexts. Such an approach limits a comprehensive understanding of how organizational, human, structural, and technological dimensions jointly shape IA effectiveness, particularly in private companies. To address this gap and enhance theoretical coherence, the present study develops an integrated conceptual framework that synthesizes five key determinants: independence, competence, IA team size, management support, and ERP adoption into a unified model explaining IA effectiveness in private firms.

Figure 1 above shows the research model for the effectiveness of IA.

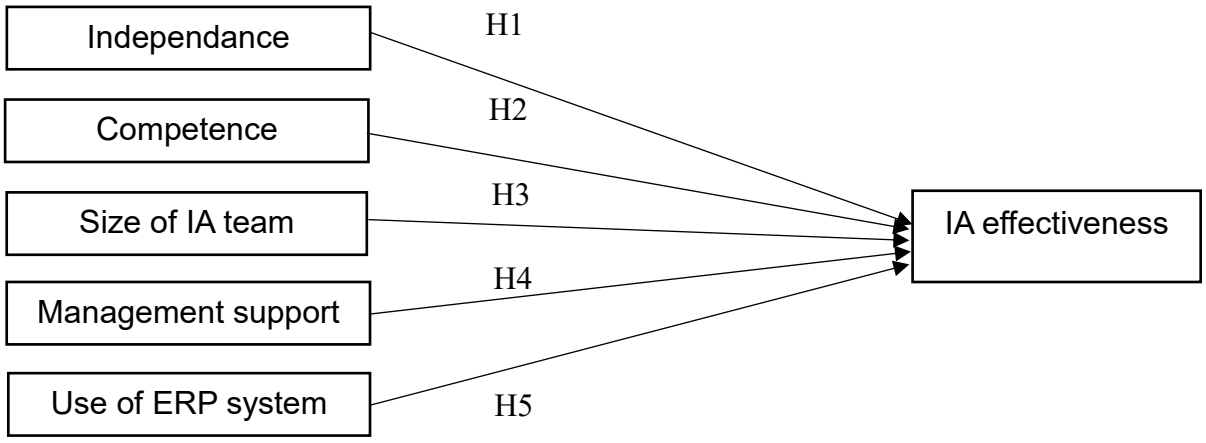

Figure 1: Conceptual Framework
Source: Created By Authors.

2.1. The Participants of Our Sample

Following table presents shows the population criteria of the internal auditing workforce that took part in the survey. The population consists of internal auditing workers for private companies, classified as 105 for a small's companies, 159 for a medium and 303 for a big firm. A google forms survey was administered to 630 internal auditing workers of private companies, done midway through 2025. Eligibility criteria for survey participants include internal auditors who have the requirements abilities for evaluating pertinent information and enough knowledge and understanding of these skills to provide adequate financial reporting. Ultimately, 589 members of the internal audit responded to the survey. Regarding data quality, a survey submitted with greater than one of its data incompletes was eliminated, and 567 survey responses remained for evaluation. Based on (Ding & al., 1995), for a population analyzed through structural exponential models (SEM), the required sampling size is merely a percentage of the population between 100 and 150, according of this, our sampling size for this research is very acceptable.

Table 1: Population Statistics of the Internal Auditors.

Demographic indicators		Observation	%
Gender	Male	401	72.49
	Female	156	27.51
	Total	567	100
Working experience	From 1 to 5 years	103	18.16
	From 6 to 10 years	155	27.34
	Over 10 years	309	54.50
Working position	Internal auditor	391	68.96
	Internal audit manager	123	21.69
	Chairman of internal audit department	53	9.35
	Total	567	100
Education degree	Bachelor	107	18.87
	Masters	411	72.48
	Professional degree	49	8.65
	Total	567	100

Source: Created By Authors, Based on Study Results.

2.2. Measurement of the Variables

The measurement model was developed through a deep literature review, with the focus on five independent variables. All the measurement items were considered in preparing the research questionnaire, the five-point Likert response scale was used in the shape of "strongly disagree" for 1 and "strongly agree" for 5. Items were selected from studies cited in table 2, and all the items were listed in table 3.

Table 2: Variable References of the IA Effectiveness

Variables	Number of items	Reference
Independence of IA	7	(Alzeban & Gwilliam, 2014)
Competence of IA	3	(Kai & al., 2022)
Team size	3	(Ta & Doan, 2022)
Management support	6	(Ta & Doan, 2022)
ERP adoption by IA	6	(Silva & al., 2023)
IA effectiveness	5	(Lenz & al., 2018)

Source: Created By Authors.

Table 3: List Of Items.

Variables	Items
Independence of IA	Internal audit staff members are sufficiently empowered by management to perform their professional duties and functions.
	The head of internal audit reports to a level within the organization that allows internal audit to fulfill its responsibilities.
	Internal audit has direct contact with the organization's board of directors
	Conflicts of interest are rare in the work of internal auditors.
	The board of directors approves the appointment and replacement of the head of the internal audit department.
	The internal audit department is in direct contact with senior management, with the exception of the chief financial officer.
	Internal audit staff have free access to all departments and employees of the organization.
Competence of IA	The internal audit staff have professional experience
	The internal audit staff receives regular training
	The internal audit staff are able to use modern technologies (IT tools and specific internal audit software).
Team size	The internal audit department has sufficient staff to cover all critical activities and processes within the organization.
	The number of internal auditors is proportional to the size and complexity of the organization.
	The size of the internal audit team allows assignments to be completed within the planned timeframe.
Management support of IA	Management supports internal audit in performing its duties and responsibilities.
	Management participates in developing the internal audit plan.
	Internal audit provides management with sufficient, reliable, and relevant reports on its work and recommendations.
	Management's response to internal audit reports is reasonable.
	The internal audit department is large enough to successfully carry out its duties and responsibilities.
	The internal audit department has a sufficient budget to successfully carry out its duties and responsibilities.
ERP adoption	The ERP system is widely used in our daily internal audit activities.
	ERP facilitates access to the data needed to perform internal audits.
	The ERP system is well integrated into internal audit processes.
	Internal auditors receive adequate training in the use of ERP.
	The ERP system improves the quality of information available for internal audit.
	ERP is a key tool in the planning of internal audit engagements.
Internal audit effectiveness	Internal audit provides accurate and reliable assessments of internal risks.
	Internal audit contributes effectively to the improvement of internal control systems.
	Audit recommendations are implemented by management and the audit committee.
	Internal audit is perceived as a key partner in corporate governance.
	Internal audit coverage is sufficient and addresses key risk areas.

Source: Created By Authors.

3. DATA ANALYSIS

The study applied Partial Least Squares Structural Equation Modeling (PLS-SEM) to approve the study constructs and verify the proposed hypotheses. The PLS-SEM was preferred due to its strong performance for handling reflective constructs of high complexity under conditions of small sample sizes and interaction effects in an acceptable manner. Additionally, the Structural Equation Model integrated multiple regressions and factor analysis combined therefore it is a more powerful approach than methods for instrument validation when considering separately estimating the various interrelated regression equations (Purwanto, 2021).

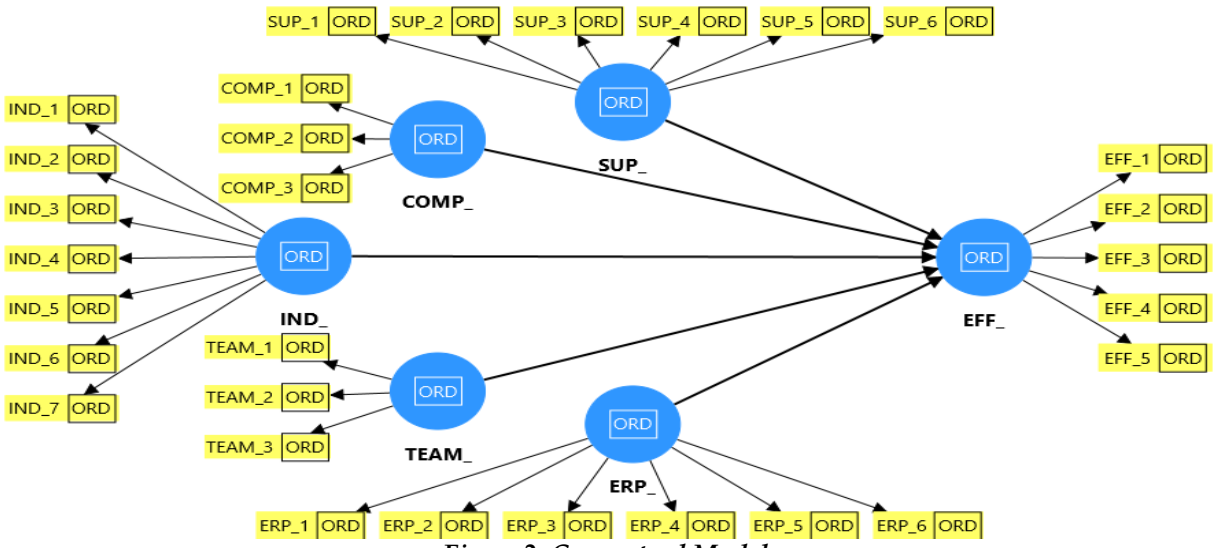

Figure 2: Conceptual Model.
Source: Smart PLS System

3.1. Model Evaluation

The measurement model examination is the preliminary step that should be conducted prior to structural interpretations. It is meant to ensure that the paradigm variables are under consideration measured in reliable and valid manner to best practices for PLS-SEM recommendations. This scale was verified for reliability, convergent validity and discriminant to see that each construct used is a valid measure of the theoretical concept and it differs empirically from all other constructs invoked in the model. Thus, the acceptance of the measurement model strengthens the reliability of structural analyses and quality of related empirical evidence.

Table 4: Measurement Model Outcome.

Constructs	Item Code	Loading	AVE	CR	Cronbach's Alpha
Independence	IND_1	0.787	0.601	0.890	0.889
	IND_2	0.794			
	IND_3	0.761			
	IND_4	0.764			
	IND_5	0.760			
	IND_6	0.792			
	IND_7	0.768			
Competence	COMP_1	0.835	0.713	0.802	0.799
	COMP_2	0.830			
	COMP_3	0.868			
Size of IA team	TEAM_1	0.832	0.717	0.805	0.803
	TEAM_2	0.858			
	TEAM_3	0.849			
Management support	SUP_1	0.791	0.610	0.873	0.872
	SUP_2	0.765			
	SUP_3	0.802			
	SUP_4	0.806			
	SUP_5	0.767			
	SUP_6	0.754			
ERP adoption	ERP_1	0.810	0.603	0.875	0.868
	ERP_2	0.798			
	ERP_3	0.783			
	ERP_4	0.764			
	ERP_5	0.723			
	ERP_6	0.778			
Internal audit effectiveness	EFF_1	0.835	0.663	0.874	0.873
	EFF_2	0.804			
	EFF_3	0.834			
	EFF_4	0.782			
	EFF_5	0.815			

Source: Created By the Authors.

The model was specified for all second-order constructs to assess composite reliability (CR), convergent validity (CV), discriminant validity, effect size (F2), and collinearity. As reported by (Hair & al., 2022), items with outer loadings exceeding 0.70 are considered adequate. The outcome of the AVE values for each items exceeds the recommended value of 0.50 suggested by (Hair & al., 2012), with values varying from 0,601 to 0,717. Such a results denote that the latent constructs explain the majority of the variance in their items, thus confirming satisfactory convergent validity. The reliability indicators also demonstrate satisfactory internal consistency. Composite reliabilities are about 0.80 in the sample, and Cronbach's alpha lies within a similar range (0.799–0.889), thereby demonstrating that responses were homogeneous and measurement scales remained consistent across all dimensions of service quality. These findings provide evidence that all of our constructs are valid and have strong internal reliability, and they can be used without further modification in later confirmatory analyses.

3.2. Discriminant Validity

Discriminant validity purports to check that every single construct in the measurement model attains a distinct conceptual dimension, and does not reveal excessive overlap with other latent variables. Such a step verifies that the measurement of a construct is more closely related to that construct than to any other construct in the model. The analysis of discriminant validity is based on complementary criteria generally recognized in the PLS-SEM literature, more precisely the HTMT ratio and the Fornell-Larcker criterion, which jointly prove the empirical distinctiveness of the constructs before the examination of structural relationships.

- **HTMT ratio**

The HTMT ratio is currently regarded as one of the most reliable indicators for assessing discriminant validity in structural modeling. It is based on a comparison between, on the one hand, the correlations observed among indicators belonging to different constructs and, on the other hand, those measured among indicators of the same construct. According to methodological recommendations, discriminant validity can be considered established when HTMT values stay under 0.85 in a strict model or below 0.90 in a more tolerant model (Hair & al., 2022). Values below these thresholds indicate sufficient empirical differentiation among the constructs.

Table 5: Results Of Discriminant Validity – HTMT Ratio.

	COMP	EFF	ERP	IND	SUP
EFF	0.548				
ERP	0.341	0.429			
IND	0.323	0.464	0.245		
SUP	0.422	0.561	0.344	0.245	
TEAM	0.373	0.376	0.305	0.334	0.345

Source : Smart Pls

The table above presents the HTMT criterion results for the full sample. Examination of the HTMT indices shows that all coefficients remain well below the recommended thresholds, indicating the absence of problematic conceptual overlap among the model's variables.

- **Fornell-Larcker ratio**

Aside from the HTMT ratio, discriminant validity was also evaluated by employed the Fornell-Larker criterion the most used method to evaluate measurement models that are based on structural equation modeling. This rule is based on the contrast between, on one hand, the square root of the Average Variance Extracted linked to every construct and, on another hand, correlations between that contrast and others latent variables in the model. Discriminant validity is considered confirmed when the square root of the AVE exceeds all inter construct correlations, illustrating that the construct shares several variances with its own items than with other variables in the model. The next table provide the outcomes of our sample.

Table 6: Results Of Discriminant Validity – Larcker and Fornell Ratio.

	COMP	EFF	ERP	IND	SUP	TEAM
COMP	0.845					
EFF	0.459	0.814				
ERP	0.285	0.377	0.776			
IND	0.274	0.410	0.216	0.775		
SUP	0.353	0.490	0.301	0.216	0.781	
TEAM	0.299	0.316	0.256	0.283	0.288	0.847

Source : Smart Pls

For the current sample, the square roots of the AVE (as provided on the main diagonal) are always higher than all off-diagonal correlations. This configuration suggests that each construct represents distinct amounts of variance and no significant redundancy can be found among the variables composing the model. These results provide empirical support in terms of Fornell-Larcker criterion on the distinctiveness of all constructs. Coupled with the results from the HTMT criterion, we can say that discriminant validity of this model is well established.

3.3. Assessment Of the Structural Model

The examination of the structural model follows a sequential procedure in conformity with the methodological recommendations of (Hair & al., 2022) for variance-based structural equation modeling. It aims to verify the statistical validity of the estimated relationships, and to measure the overall quality of the model in terms of both explanatory power and predictability.

3.4. The Collinearity Analysis

The examination of the structural model requires, as a preliminary step, it is necessary to ascertain that excessive redundancy does not exist amongst the explanatory constructs. When multiple exogenous variables are highly correlated, the estimation of structural relationships may become unstable and lead to imprecise interpretation of the estimated effects. For this reason, collinearity measurement was performed using the Variance Inflation Factor (VIF).

Regarding PLS-SEM models, Hair & al., (2022) emphasize that low VIF values indicate a distinct contribution of the predictor constructs, whereas high values may reveal interdependencies that could compromise the reliability of the structural coefficients. As a general guideline, VIF values below 3 are commonly considered indicative of an acceptable collinearity level. The output table of the collinearity analysis is presented above.

Table 7: Results Of the Collinearity Analysis – VIF Ratio.

COMP	1.266
ERP	1.183
IND	1.156
SUP	1.245
TEAM	1.212

Source: Smart Pls

From the table above which is on collinearity test result, it can be seen that, all predictor constructs exhibit low and closely clustered VIF values. In the full sample, VIF values range from 1.156 to 1.266, reflecting a very limited level of collinearity among the model's explanatory variables. This lack of dispersion of values around unity indicates that the constructs do not share excessive variance and that none of them artificially dominates the explanation of the endogenous variable. In other words, each construct retains a distinct and independent contribution to the structure of the model, without informational redundancy that could bias the parameter estimates.

- **Model hypothesis testing and analysis**

After verifying the absence of problematic collinearity among the predictor constructs and confirming the validity of the measurement model, the analysis focuses on examining the structural relationships postulated in the conceptual model. This first stage seeks to evaluate, from the empirical data, the direction, force and statistical relevance of the relationships among the independent variables suggested and effectiveness of IA.

The analysis of the structural relations is accomplished through path coefficients analysis estimated according to the PLS-SEM approach, combined with a bootstrapping procedure to obtain confidence intervals, t-values, and associated significance levels. These indicators allow a full consideration of the structural effects on the basis of their magnitude and statistical significance in line with the methodological recommendations of Hair& al., (2022). The outcomes of the hypothesis examination are exposed in the table above.

Table 8: Outcomes Of the Significance Tests for the Structural Paths.

	Links	B	Confidence interval 95 %	*T Values*	*P Values*
H	**COMP_ -> EFF_**	0.229	[0.156 ; 0.299]	6.353	0.000
H	**ERP_ -> EFF_**	0.159	[0.093 ; 0.226]	4.662	0.000
H	**IND_ -> EFF_**	0.233	[0.167 ; 0.304]	6.716	0.000
H	**SUP_ -> EFF_**	0.295	[0.224 ; 0.364]	8.138	0.000
H	**TEAM_ -> EFF_**	0.056	[-0.010 ; 0.122]	1.655	0.098

Source : Smart Pls

Base on table 8, there is a positive and important relationship among the auditor competence and the effectiveness of IA (β = 0.229, t = 6.353, p < 0.001). The 95% CI [0.156; 0.299] does not include zero, which demonstrates the robustness of this effect. This result confirm that the level of effectiveness is positively associated with higher auditors 'competency.

Firms' use of ERPs also positively affects audit quality (β= 0.159, t = 4.662 p < 0.001). The confidence interval [0.093; 0.226] also highlight that this association is very solid. The impact is small but statistically significant, and it indicates that ERP systems have an efficiency enhancing potential for auditors.

Table 8 shows that auditor independence emerged as highly relevant factor but affect positively to effectiveness of IA process (β = 0.233, t = 6.716, p < 1%). The 95% confidence interval [0.167; 0.304] does definitely confirm a strong and consistent association. Such a connection emphasizes the impact of auditor independence in enhancing IA effectiveness.

Our notice exposes that the management support turns into the highly significant factor in the model. The value of the path coefficient is positive and highly important (β = 0.295, t-value absolute = 8.138 < 0.001) indicating its importance as well. The robustness of this effect is proved by the confidence interval [0.224; 0.364], which means that management intervention is a positive condition for maintaining the efficiency and success of IA activity.

Audit team size, on the other hand, does not demonstrate any statistically significant impact to AI effectiveness (β = 0.056, t = 1.655, p = 0.098). Zero is in the 95% CI [-0.010; 0.122], which means that this connection is not statistically significant. This discovery implies that, relative to this study, the scale of human resources devoted to IA do not necessarily have an independent role for determining the effectiveness of this activity.

In general, with the exception of hypothesis 6 (in relation to audit team size), the test results provide empirical support for the proposed hypotheses as a follow-up to a series of analyses at this stage. They note the significance of human, organizational, and technological factors in the explanation of IA effectiveness. Audit quality seems to be disproportionately influenced by qualitative and organizational rather than merely quantity of resources.

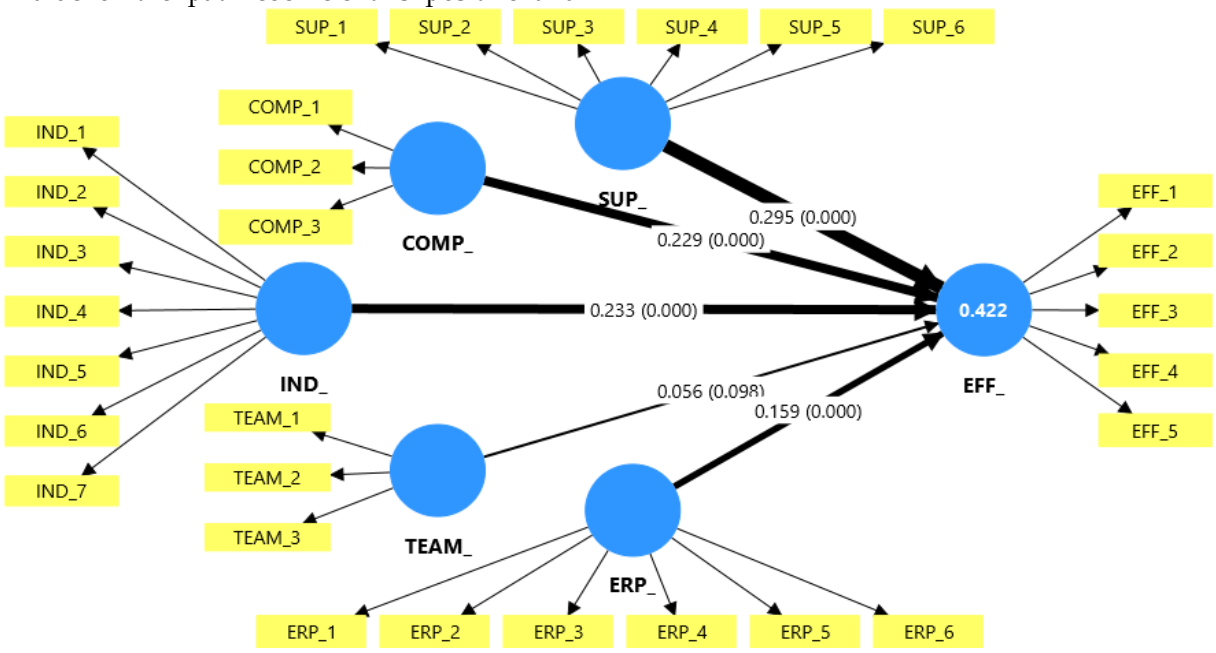

Figure 3: Structural Model.
Source: Created By Author with Smart PLS

- **Assessment of the Relative Importance of Structural Effects**

The statistical significance of the structural relationships, the analysis of effect sizes allows for the assessment of their relative importance in explaining the endogenous variable, audit effectiveness. Unlike path coefficients, which provide information on the direction and existence of

relationships, the f^2 effect size indicates the extent to which each predictor construct effectively contributes to the explanatory power of the model. In accordance with the benchmarks proposed by Cohen (1988), f^2 values can be interpreted using the following thresholds: a value around 0.02 represents a small effect, a value of approximately 0.15 indicates a medium effect, and a value near 0.35 reflects a large effect.

Table 9: Results Of the Relative Importance of Effects – F^2 Criterion (Effect Size).

	Effect Size f^2
COMP_ -> EFF_	0.072
ERP_ -> EFF_	0.037
IND_ -> EFF_	0.081
SUP_ -> EFF_	0.121
TEAM_ -> EFF_	0.004

Source : Smart Pls

The outcome provided in previous table demonstrate that management support operates the highly substantial relative effect on IA effectiveness (f^2 =0.21). In the same time, this value is smaller than Cohen criterion, but it is more powerful than all the other relations, which means that management support has a strong explanatory capacity toward IA effectiveness. For the other variables, specifically independence and competence of internal auditors, they have a significant effect size with respectively 0.081 and 0.072. This outcome suggests that these variables contribute notably to improve IA effectiveness. In terms of adoption of ERP systems, and with a smaller size effect like 0.037, this effect is limited as per Cohen, meaning that ERP systems have a complementary role in explaining IA effectiveness rather than being central to the predictions. Finally, the IA team size present an almost insignificant effect with 0.004, this value confirms that IA team size has no explanatory power added to the model.

As a conclusion, the f^2 analysis demonstrates a clear hierarchy between the determinants of IA effectiveness. It reveals that, among all the explicative variables, management support and independence play a major role than competence, team size and the use of ERP. This finding matches the analysis of statistical significance.

- **Examination of the Explicative and Predictive Power of the Model**

The examination of the structural model applies the examination of the range to which the model can explicate the endogenous variable and generate relevant predictions. For this reason, two supplementary measures are used, the first one is the coefficient (R^2) and the second is Q^2 index.

Table 10: Results Of the Model's Explanatory and Predictive Power R^2 and Q^2 Criteria.

	Adjusted R^2	**Q^2 predict**
Internal audit effectiveness	0.417	0.409

Source : Smart Pls

The coefficient of determination (R^2) was employed to evaluate the power of the explanatory framework. In our model, the (R^2) value related to IA effectiveness reaches 0,417. This outcome signify that the explanatory variables selected allows to explain 41.7% of the variance in IA effectiveness. Such a result presents a significant extent of explanation, specifically applicable in our model who include a multitude type of factors. This finding is in adequate line with the conceptual framework and the empirical observed relationships. The prediction power (Q^2) obtained regarding IA effectiveness reaches 0.409, such results denote that the model has real predictive relevance and generate more precise predictions, this higher value indicates that the model not only matches the observed data, but also present strong predictive potential for other observations.

jointly, the R^2 and Q^2 values signify that the verified model holds a good ability of prediction with an acceptable power of explanation. Such as outcome confirms that constructs used to predict and explain IA effectiveness are relevant.

4. LIMITATIONS

Despite its methodological rigor, this study presents several limitations that should be acknowledged. First, the sample size, although acceptable for PLS-SEM analysis, remains relatively limited and may constrain the generalizability of the findings. In addition, the sample may be concentrated within specific sectors or organizational contexts, which could limit the applicability of the results to other industries, organizational sizes, or institutional environments. Second, the study relies primarily on self-reported data collected from respondents involved in the internal audit function. Such data may be subject to social desirability bias,

perceptual bias, or overestimation of internal audit effectiveness, particularly when respondents evaluate their own organizational practices. Finally, the cross-sectional research design limits the ability to establish causal relationships between the identified factors and internal audit effectiveness. It also does not allow for observation of how improvements in governance structures or audit practices may influence effectiveness over time.

4.1. Perspectives For Future Research

Future research could extend this work in several important directions. First, applying the measurement model to larger and more diverse samples across different sectors, countries, or institutional contexts would enhance external validity and allow for comparative analyses of internal audit effectiveness across organizational environments. Second, future studies could incorporate additional variables into the conceptual framework, such as digital transformation of audit processes, use of data analytics, organizational risk culture, board oversight quality, or regulatory compliance intensity. Integrating these complementary dimensions would contribute to a more comprehensive understanding of the determinants of internal audit effectiveness.

4.2. Managerial And Policy Implications

The findings of this study provide several actionable implications for organizational leaders, audit committees, and policymakers. First, strengthening the independence and organizational positioning of the internal audit function is essential. Ensuring direct reporting lines to the audit committee or board of directors enhances objectivity and reduces managerial interference, thereby improving effectiveness. Second, investing in the professional competence and continuous training of internal auditors is critical. Organizations should prioritize certifications, technical skill development, and capacity building in emerging areas such as data analytics, cybersecurity auditing, and risk-based auditing. Third, strong top management and audit committee support significantly contribute to internal audit effectiveness. Clear communication, adequate resource allocation, and recognition of the internal audit function as a strategic partner rather than merely a compliance mechanism can enhance its value contribution. Finally, policymakers and regulators may consider reinforcing governance frameworks that promote transparency, accountability, and internal control quality. Encouraging adherence to international internal auditing standards and best practices can further strengthen the institutional environment supporting effective internal audit functions.

5. CONCLUSION

This research investigated the determinants of IA effectiveness in Moroccan private companies by examining the impact of five factors, the independence of auditors, competence, team size, management support and the use of ERP systems applying the PLS path modeling approach. The empirical findings confirm that professional competence and independence of internal auditors have an important positive effect on IA effectiveness. Additionally, we discovered that the use of ERP has positive but modest effect on IA effectiveness, the use of ERP systems can contribute to IA in terms of accessibility and real time controlling.

Between all analyzed determinants, management support was revealed as the mean influential predictor of IA effectiveness, emphasizing the major role of top management commitment in the provision of resources, and in strengthening the authority of IA function. On the contrary, IA team size didn't present a statistically significant effect on IA effectiveness. These results confirm that the quality of IA depends more on competence, independence, organizational support, and effective use of technology than on the number of human resources.

Basically, this research contributes to IA literature by demonstrating that IA effectiveness is impacted by human, organizational and technological factors. Further, the empirical outcomes of this research can help managers, regulators and policy makers to explore how top management commitment might improve IA effectiveness.

Further research should be continued on this subject by incorporating the moderate effect of digital maturity, this novelty can offer a deeper comprehension regarding how technological abilities and organizational component in Moroccan private companies can enhance IA effectiveness.

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