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RESEARCH ARTICLE

Impact of Cooperation between Internal and External Auditors on Internal Audit Effectiveness in Moroccan Public Companies: Analysis using the Structural Equation Modeling (SEM)

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ABSTRACT

The aim of this study was to examine the factors influencing (determining) the effectiveness of the internal audit function in Moroccan public companies. The research sample consisted of 137 respondents. The results of statistical tests showed that management independence, competence and support could increase the effectiveness of the internal audit function. However, this cooperative relationship did not moderate the impact of management competence and support on internal audit effectiveness. The practical implication of this study is that, in order to increase internal audit effectiveness, internal auditors must adopt an attitude of independence, objectivity and freedom from conflicts of interest in the exercise of their professional responsibilities. The practical value of this study also shows that to increase the effectiveness of internal auditing in the public sector, internal and external auditors need to strengthen their cooperation, particularly with regard to activities requiring collaboration between internal and external auditors, communication between internal and external auditors, and the sharing of working tools and documents between internal and external auditors.

INTRODUCTION

The role of internal audit in public service organizations is to provide a means of independent assessment and review, to determine and report on the level of control reliability (Coupland, 1993; Arena et al., 2006). The role of internal audit has traditionally focused solely on internal control and financial management compliance (Gharrafi & Kerfali, 2019). However, internal audit has evolved significantly in recent years towards a broader internal advisory role within the corporate risk management function. Consequently, it is important to examine the extent to which internal auditing is operating effectively as originally intended (Alzeban & Gwilliam, 2014; Davidson, 1991). The effectiveness of public sector internal audits in Morocco is a necessity to meet the public's growing demands for good governance. In addition, regional financial management in various Moroccan public companies with market activities in the Kingdom has not been

fully implemented in accordance with regulations. In the summary of the Cour des Comptes report on the management of Moroccan public companies, there are still various irregularities in regional financial management indicating criminal acts and causing losses (Ezziadi & Gharrafi, 2019).

Several previous studies have examined the factors impacting the effectiveness of internal auditing in the public sector. Among the variables analyzed are auditor competence, the cooperative relationship between internal and external auditors, management support for internal audit and internal audit independence. However, the results of these studies show some inconsistency characterizing the determinants of internal audit effectiveness in public organizations (Alzeban and Gwilliam, 2014; Shamsuddin, 2014; Chidinma et al., 2016; Udeh and Nwadialor, 2016; Kagaba and Mulyungi, 2016; Mupeta, 2017; Montondon and Fischer, 1999; Ofori and Lu, 2018; Saputra et al., 2020; Ratnawati, 2020). The inconsistency of results testing the determinants of internal audit effectiveness in public organizations indicates the need for further research by developing research models.

Hair et al. (2017) stated that if the impact of the independent variable on the dependent variable varies in various situations, this may be caused by the presence of a moderator variable. Based on Hair et al.'s (2017) explanation, this study develops a research model to determine the effectiveness of internal auditing within Moroccan public companies with market activity by adding a moderator variable. We can therefore pose two main questions:

First question: **What are the determinants of internal audit effectiveness in Moroccan public companies**?

Second question: **To what extent does the cooperative relationship between internal and external auditors impact internal audit effectiveness?**

Thus, the relevance of this research is as follows:

Firstly, the results of this study can make an audit-related contribution, as well as providing evidence and analysis of the factors affecting internal audit effectiveness. For Moroccan public companies with market activities, this research can help to understand the factors that can affect the effectiveness of internal auditing, and should become a reference for the implementation of effective internal auditing.

To answer our questions, we will first review the body of theoretical and empirical work dealing with the question of the effectiveness of internal audit functions in public organizations, then outline the research methodology adopted to answer our questions, the results and discussions in the fourth point, and finally conclude with the main contributions, limitations and research prospects.

1. LITERATURE REVIEW

In Moroccan law, internal auditing is defined as an independent and objective activity in the form of assurance and consulting, which aims to add value and improve an organization's operations (Benazzi & Gharrafi, 2020). This activity helps the organization (auditee) achieve its objectives by using a systematic and orderly approach to evaluate and improve the effectiveness of risk management, control and governance processes.

1.1. Auditor independence

The agency relationship can be defined as a contract between the organization's owner and the company's top executives. The executives work in the organization as agents to provide services on behalf of the owners, who delegate decision-making power to the executives. This power can be misused by executives to serve their personal interests. Therefore, the existence of an audit committee, external and internal auditors, will help organizations to improve performance and also ensure that management implements plans in accordance with procedures (Adams, 1994).

Internal auditors are often employed by senior management but, at the same time, they are also agents of the board of directors and audit committees who believe in the ability of internal auditors to assess the

performance of senior management. Internal auditors are expected to carry out the audit process at a professional level, requiring professional training and certification, experience and other skills necessary to fully discharge their responsibilities. Internal auditors with these requirements in addition to the existence of a training program for internal auditors will increase the level of confidence of the board and audit committee in the competence of internal auditors (Endaya & Hanefah, 2013).

International professional guidelines and standards, which refer to the institute of internal auditors, demonstrate that adequate independence and objectivity can be achieved by reporting to the organizational level that enables the internal audit department to discharge its responsibilities undisturbed; avoid conflicts of interest; have direct contact with the Board of Directors and senior management; have unrestricted access to files, employees and departments; not place the appointment and dismissal of Heads of Internal Audit under the direct control of senior management; and not perform non-audit work.

Previous research has shown that lack of independence is an obstacle to satisfactory internal audit performance in developing countries. In South Africa, Schyf (2000) identified the lack of independence of internal audit as a problem facing the internal audit function in the country. In particular, he identified concerns about the form of communication and level of reporting, as well as implications for independence. Another study in developing countries highlighted that the audit function's lack of independence reduced internal audit effectiveness (Brierley et al., 2003; Ofori & Lu, 2018). In contrast, the study by Chidinma et al. (2016), Kagaba & Mulyungi (2016), Mupeta (2017) and Saputra et al. (2020) show empirical evidence that adequate independence can increase the effectiveness of internal auditors.

H_1 : The independence of internal auditors would have a positive impact on the effectiveness of internal auditing within Moroccan public companies.

1.2. Auditor competence

Auditor competence is a key factor in the effectiveness of internal auditing (IIA, 2006).

Several studies have been carried out in the public sector on the effect of auditor competence on internal audit effectiveness. The results of previous studies point to weak competence as one of the factors reducing internal audit effectiveness (Brierley et al, 2001, 2003: Gwilliam & El-Nafabi, 2002; Mihret & Yismaw, 2007; Mupeta, 2017; Shamsuddin, 2018; Ofori & Lu, 2018). Conversely, adequate auditor competence can increase the effectiveness of internal auditors in government (Udeh & Nwadialor, 2016; Saputra et al., 2020; Ratnawati, 2020).

H_2 : The competence of internal auditors has a positive impact on the effectiveness of internal auditing within Moroccan public companies.

1.3. Support from general management

With the support of top management, internal auditors can obtain sufficient resources to carry out their tasks and responsibilities, and the internal audit department can employ qualified staff and provide ongoing training for its development (Alzeban & Sawan, 2013; Cohen & Me,

The International Standards for the Professional Practice of Internal Auditing (ISPPIA) have emphasized the importance of the relationship between internal auditing and top management, and how management can support internal auditing. Senior management must be involved in the internal audit plan.

Previous research indicates that top management support is an important factor in the success of the internal audit function. Other researchers have found that management support is one of the most important determinants of internal audit effectiveness in the public sector, after the adequacy of audit staff. They stated that with management support, internal audit recommendations are likely to be implemented, and internal audit resources will be good in terms of staffing and budget. Van Gansberghe (2005) shows that to be effective, internal auditing needs management support and appreciation of the contribution internal auditing can make to the organization's value. Other research findings show that adequate

management support can increase the effectiveness of internal auditing, including Kagaba and Mulyungi (2016), Mupeta (2017), Arena and Azzone (2007, 2009) and Saputra et al. (2020).

H_3 : Management support has a positive impact on the effectiveness of internal auditing in Moroccan public companies.

Coordination and cooperation between internal and external auditors play an important role that benefits both the organization and external stakeholders. Examples of such coordination and cooperation include joint planning, exchange of information, advice and reports to facilitate high-quality audits and avoid unnecessary duplication of work.

When presenting the results of internal audit activities, external auditors and/or other auditors are expected to use these results to reduce the scope of their assignments.

1.4. The cooperative relationship

Previous research has shown that a good collaborative relationship between internal and external auditors will increase the efficiency and effectiveness of audits and help management deliver quality public services (Shamsuddin, 2018). Lack of cooperation between internal and external auditors has been identified as a factor affecting the quality of public sector audits in developing countries (Brierley et al., 2001; Gwilliam & El- Nafabi, 2002; Sterck & Bouckaert, 2006). Al-Garni (2008) found that a lack of cooperation between external and internal auditors can weaken the impact of competence, independence and management support on internal audit effectiveness. Good cooperation between internal and external auditors should reinforce the positive impact of these three factors on internal auditing.

H_4 : The cooperative relationship between internal and external auditors reinforces the positive impact of independence on the effectiveness of internal auditing in Moroccan public companies.

H_5 : The cooperative relationship between internal and external auditors reinforces the positive impact of competence on the effectiveness of internal auditing in Moroccan public companies.

H_6 : The cooperative relationship between internal and external auditors reinforce the positive impact of management support on the effectiveness of internal auditing in Moroccan public companies.

2. RESEARCH METHODS

The internal audit effectiveness variable is measured by providing a score on aspects of the internal audit function, namely the ability to plan, develop the organization's productivity, assess the consistency of results with predetermined goals and objectives, implement internal audit recommendations, assess and improve risk management, evaluate the internal control system and recommend improvements.

The internal audit staff competence variable is measured by providing a score on internal audit staff attributes, i.e. professional experience in the internal audit field, continuous training (average annual training hours).

The internal audit independence variable is measured by providing a score on the attributes of internal audit independence, namely level of independence, level of reporting, direct contact with the board of directors and senior management, conflicts of interest, interference, unrestricted access to all departments and employees, appointment and removal of the head of internal audit, and performance in non-audit activities. The variable of management support for internal audit is measured by providing a score for the attributes of management support for internal audit, namely support for internal audit in carrying out its duties and responsibilities, involvement in internal audit planning, reports on the work of the internal audit team sent to management, management responses to internal audit reports, and internal audit department resources.

The variable of cooperation between internal and external auditors is measured by providing a score on attributes of the relationship between internal and external auditors, namely attitudes towards external

auditors, coordination (including discussion of common interests), discussion of audit plans, external auditors' level of confidence in internal audit, audit work, frequency of meetings, sharing of working papers and management of promotions on the relationship between the two organizations.

Respondents were asked to provide an assessment using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree".

The population of this study was made up of auditors in public companies. With this in mind, we set up a sampling strategy that we felt would ensure easy access to develop our sample base. To administer our questionnaire, we used a non-probabilistic sampling method. This method is justified by the fact that the choice of participants is closely linked to their contributions and their relevance to the objectives of the survey. More specifically, we mobilized the "snowball" sampling technique. Primary data were obtained via a questionnaire distributed to internal auditors.

The data analysis approach used in this research is component- or variant-based structural equation modeling (SEM), better known as the partial least squares (PLS) approach. The software used for this analysis was WarpPLS 7.0.

The PLS method does not require multinormality of the variables (which is necessary in the case of methods based on covariance analysis). It can work with any form of variable (nominal, interval or continuous). Sample size constraints are more flexible: unlike CBSEM methods, which require a minimum sample size of 200 observations (Roussel & al, 2002), PLS estimation is feasible with small samples. As recommended by Chin (1998), a simple rule of thumb is to require the number of observations to be greater than or equal to 10 times the number of indicators of the most complex formative variable, and/or 10 times the number of structural relationships emanating from the central construct of the structural model. This advantage is of particular interest in the field of auditing and management research, since it is sometimes difficult to gather sufficiently large samples to enable estimation using Lisrel-type methods (Tritah, S., & Daoud, M ;2021). The PLS method is therefore well suited to exploratory analyses, in which the researcher does not always have the benefit of a large sample, nor of widely-proven measurement scales (Sosik & al ; 2009).

3. RESULTS AND DISCUSSION:

The research data used in this study are primary data obtained from a questionnaire distributed to auditors of public companies with market activities. Up to the deadline for returning the questionnaire, out of 187 questionnaires distributed, 137 were returned. The return rate was 73.26%, and the remaining 26.47% were not returned. The profile of the respondents in this study was mainly female, with an undergraduate level of education. In addition, their professional experience and training are in the right category.

Descriptive statistics were used to analyze the data according to respondents' answers to each of the research variable indicators. Table 1 below shows the descriptive statistics for respondents' answers.

Table 1: Descriptive statistics

Variables	N	Theoretical interval	Average	Real interval	Average	Standard deviation
Relations between internal and external auditors	137	10-50	31.00	17 - 50	33.04	**5.42**
Management support	137	6-30	17,50	16 - 30	23.63	**3.51**
Independence	137	6-30	17,50	14 - 30	19.58	**3.12**
Efficiency	137	11-55	33.00	33 - 55	45.72	**5,94**
Competence	**137**	**2-10**	**6.00**	**2-10**	**7.15**	**1.98**

Source: personal elaboration

Based on Table 1, the variable of cooperation with the auditor has a theoretical range between 10 and 50 with a mean value of 31. In the actual range, the variable of relationship with the auditor has a range of 17 to 50 with a mean value of 33.04 and a standard deviation of 5.42. The mean value of responses to these variables in the actual range is higher than the mean value in the theoretical range. This analysis indicates that respondents' perception of the relationship with the auditor variable is at a strong level. The management support variable has a theoretical range of between 6 and 30, with an average value of 17.5. In reality, the management support variable has a range of 16 to 30, with a mean value of 23.63 and a standard deviation of 1.5.

This analysis indicates that respondents' perception of the Management support variable is at a high level. The Management Support variable has a theoretical range of 6 to 30, with a mean value of 18. In reality, the independence variable has a range of 14 to 30, with a mean value of 19.58 and a standard deviation of 3.12. This analysis indicates that respondents' perception of the auditor relationship variable is at a high level.

The internal audit effectiveness variable has a theoretical range of 11 to 55, with a mean value of 33. In reality, the internal audit effectiveness variable has a range of 33 to 55, with a mean value of 45.72 and a standard deviation of 5.94. This analysis indicates that respondents' perceptions of the internal audit effectiveness variable are at a high level. The internal auditor's competence variable has a theoretical range of between 2 and 10, with a mean value of 1.5.

In the actual range, the variable internal auditor competence) has a range of 2 to 10 with a mean value of 7.15 and a standard deviation of 1.98. The mean value of responses to these variables in the actual range is higher than the mean value in the theoretical range. This analysis indicates that the respondent's perception of the internal auditor's competence variable is at an adequate level.

The PLS method involves two stages of model evaluation, namely the evaluation of the measurement model or external model and the evaluation of the structural models or internal model. Evaluation of the measurement model is carried out on the basis of the following criteria convergent validity, discriminant validity and composite reliability, while evaluation of the structural model is carried out on the basis of the path coefficient criterion and its significance (t-test) and the value of R^2 (Hair et al., 2017).

The convergent validity of measurement models with reflective indicators was assessed on the basis of the correlation between indicator scores and the construct score (external loads). An individual indicator can be considered valid if it has a correlation value greater than 0.70. However, the correlation value between 0.40 and 0.70 can be accepted with significant conditions with a p-value less than 0.05 (Hair et al., 2017). Table 2 below shows the loading factor for the values of each of the reflexive construct indicators.

Table 2: Convergent validity of latent reflexive variables

Independence	Relations between internal and external auditors	Management support	Efficiency	Type	P
ind1	0.877				**<0.001**
ind2	0.868				**<0.001**
rel1		0.776			**<0.001**
rel2		0.754			**<0.001**
rel3		0.751			**<0.001**
rel4		0.764			**<0.001**
rel5		0.792			**<0.001**
support 1			0.711		**<0.001**
support 2			0.672		**<0.001**

support3			0.798		**<0.001**
support4			0.768		**<0.001**
support5			0.763		**<0.001**
effect1				0.793	**<0.001**
effect2				0.722	**<0.001**
effect3				0.640	**<0.001**
effect4				0.875	**<0.001**
effect5				0.833	**<0.001**
effect6				0.845	**<0.001**
effect7				0.863	**<0.001**
effect8				0.834	**<0.001**
effect9				0.871	**<0.001**
effect1				0.866	**<0.001**
effect1				**0.772**	**<0.001**

Source: personal elaboration

Four latent variables are measured reflexively, namely independence, the cooperative relationship between internal and external auditors, management support and the effectiveness of the internal audit function. As shown in Table 2, all these latent variables met the criteria for convergent validity, indicated by the loading value of the indicators being greater than 0.60 (above the minimum of 0.40) and significant at alpha 0.001.

Meanwhile, the convergent validity of latent variables that is measured formatively is assessed with the weight indicator (Hair et al, 2017). The conditions to be met are the indicators of the formative latent variables must be significant and there is no multicollinearity.

Table 3: Convergent validity of formative latent variables

	Competition	**Type**	**SE**	**P-value**	**VIF**
comp1	0.664	Formative	0.074	<0.001	**1.041**
comp2	**0.664**	**Formative**	**0.074**	**<0.001**	**1.041**

Source: personal elaboration

Table 3 shows that the weighting of the skill indicators is 0.664 respectively and is significant with a p-value<0.001. Furthermore, there is no multicollinearity indicated by a VIF value of 1.041 below the maximum limit of 5 (Hair et al., 2017). Thus, the criteria for convergent validity were met. Discriminant validity was analyzed by the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (Hair et al., 2017). Table 4 shows the results of the Fornell-Larcker criterion, namely the root of the average variance extracted (AVE) in the diagonal column and the correlation between latent variables in the same column. Discriminant validity is satisfied if the root of the AVE in the diagonal column is greater than the other numbers in the same column. The results in Table 4 show that the criteria for discriminant validity are met.

Table 4: Discriminant validity: Fornell-Larcker criterion

Variables	**Independence**	**Competence**	**Relations between internal and external auditors**	**Managemen t support**	**Efficiency**
Independence	0.869	-0.159	-0.034	0.043	**0.198**
Competence	-0.159	0.774	0.156	0.265	**0.287**
Relations between internal and external auditors	-0.034	0.156	0.741	0.598	**0.442**
Support	0.043	0.265	0.598	0.728	**0.639**
Efficiency	**0.198**	**0.287**	**0.442**	**0.639**	**0.785**

Note: The square roots of the average variances extracted (AVE) are shown on the diagonal.

Source: personal elaboration

In addition to the Fornell-Larcker criterion, discriminant validity was also assessed by the HTMT ratio, the results of which are presented in Table 5. Discriminant validity is fulfilled indicated by the total HTMT ratio below the maximum limit of 0.85 (Hair et al., 2017).

Table 5: Discriminant validity: HTMT ratio

Variables	Independence	Competence	Relations between internal and external auditors	Management support
Competence	0.345			
Relations between internal and external auditors	0.172	0.304		
Management support	0.099	0.592	0.767	
Efficiency	**0.280**	**0.508**	**0.512**	**0.765**

HTMT ratios (good if <0.90, better if <0.85)

Source: personal elaboration

In addition to assessing convergent and discriminant validity, construct reliability is also assessed by composite reliability and Cronbach's alpha. The results in Table 6 show that construct reliability was met, indicated by composite reliability and Cronbach alpha values above 0.70 (Hair et al., 2017). In addition, the AVE met the 0.50 criteria above.

In SEM-PLS analysis, it is also necessary to ensure that the model is free of the full collinearity problem (Hair et al., 2017). The results in Table 6 show that there is no full collinearity problem indicated by the full collinearity VIF value below 3.3. Overall, the evaluation of the measurement model met the requirements, so the analysis can be continued on the structural model for hypothesis testing.

Table 6: Composite reliability and total collinearity

Criteria	Independence	Competence	Relations between internal and external auditors	Management support	Efficiency
Composite reliability	0.870	0.3	0.879	0.848	**0.936**
Cronbach's Alpha	0.685	0.333	0.784	0.766	**0.956**
AVE	0.754	0.620	0.549	0.529	**0.625**
Total collinearity VIF	**1.243**	**1.218**	**1.909**	**2.224**	**1.975**

Source: personal elaboration

The evaluation of the structural model aims to test the hypothesis by analyzing the path coefficients between the latent variables and their significance. Before analyzing the results of the path coefficient test, an evaluation of the model fit was carried out with the index provided by the WarpPLS 7.0 software output (Kock, 2020). Based on the structural model results, the hypothesis testing results can be summarized as presented in Table 7.

Table 7: Hypothesis testing results

Variable path	Coefficient	p-value	Results	Effect size
Independence → Efficiency	0.363	<0.001	Accepted	**0.140**
Competence → Efficiency	0.175	0.018	Accepted	**0.052**
Support → Efficiency	0.538	<0.001	Accepted	**0.352**

Independence * Relationship → Efficiency	0.165	0.023	Accepted	**0.047**
Competence * Relationship → Efficiency	-0.083	0.162	refused	**0.018**
Support * Relationship → Efficiency	0.085	0.155	refused	**0.025**
R-square		0.541		
Q-squared		**0.543**		

Source: personal elaboration

Hypothesis 1 indicates that independence has a positive impact on the effectiveness of the internal audit function. The results in Table 7 show that the path coefficient is 0.363 and is significant with a p-value of less than 0.001. Thus, Hypothesis 1 is validated by the empirical evidence of this study. Hypothesis 2 indicates that competence has a positive impact on the effectiveness of the internal audit function. The results in Table 7 show that the path coefficient is 0.175 and is significant with a p-value of less than 0.05. Thus, Hypothesis 2 is validated by the empirical findings of this study. Hypothesis 3 indicates that management support has a positive impact on the effectiveness of the internal audit function. The results in Table 7 show that the path coefficient is 0.538 and is significant with a p-value of less than 0.001. Thus, Hypothesis 3 is validated by the empirical evidence of this study.

In addition, the results of hypothesis testing are analyzed with regard to the role of cooperation between internal and external auditors in strengthening the impact of these three factors on the effectiveness of the internal audit function.

Hypothesis 4 indicates that the cooperative relationship between internal and external auditors reinforces the positive independent impact on internal audit effectiveness. The results of the test show that the coefficient of the interaction between independence and the relationship is 0.165 and is significant with a p-value of less than 0.05. These results show that hypothesis 4 is validated.

Hypothesis 5 indicates that the cooperative relationship between internal and external auditors reinforces competence and the positive impact on internal audit effectiveness. The test results show that the interaction coefficient between competence and cooperation (competence* relationship) is -0.083 and insignificant with a p-value greater than 0.05. These results indicate that hypothesis 5 is not validated.

Hypothesis 6 indicates that cooperative relationships between internal and external auditors reinforce the positive impact of management support on internal audit effectiveness. The test results show that the interaction coefficient of management support and cooperation (support * relationship) is 0.085 and is not significant with a p-value greater than 0.05. These results indicate that hypothesis 6 is not validated.

The structural model is also evaluated by analyzing the R-squared coefficient of determination. The coefficient of determination (R-squared) 0.75; 0.50; and 0.25 for each endogenous latent variable in the structural model can be interpreted as substantial, moderate and weak (Hair et al., 2017). The R-Squared value in Table 7 is 0.541, which is included in the moderate category. This also means that the variance of the exogenous variables in this research model can explain the endogenous latent variables by 54.1%. The Q-squared value is an indicator of predictive relevance (Hair et al., 2017). A Q-squared score greater than zero indicates that the exogenous latent variable has predictive relevance for the affected endogenous latent variable. The results in Table 7 show a Q-squared value of 0.543, which indicates that the exogenous latent variables in this research model have predictive relevance in explaining the practice of internal audit effectiveness. Effect size is calculated as the absolute value of each predictor's latent variable on the R-squared criterion variable. Effect size can be grouped into 3 categories, namely small (0.02), medium (0.15) and large (0.35). According to the results in Table 7, the exogenous latent variable of the predictor that had a major contribution was management support, while independence was in the medium category.

DISCUSSIONS AND IMPLICATIONS

The results of the hypothesis tests show that there is a positive impact of internal audit independence on internal audit effectiveness. This indicates that the greater the independence of internal auditing, the

greater the effectiveness of internal auditing. High internal audit independence can be observed from indicators that include the level of independence, conflicts of interest, direct contact with top management, unrestricted access to all departments and employees, appointment and dismissal of the head of internal audit, and performance on non-audit activities. When these indicators are high, the internal audit function will be more effective. This is shown by the descriptive statistics of the research, which show that the mean value of responses to the management support variable is higher than the theoretical mean value, and then the mean value of responses to the internal audit effectiveness variable is also higher than the mean value of the theoretical range.

These results support research by Alzeban and Gwiliam (2014), Chidinma et al. (2016), Kagaba and Mulyungi (2016), Mupeta (2017) and Saputra et al. (2020) show empirical evidence that adequate independence can increase the effectiveness of internal auditors. The results of this hypothesis test also show that to increase the effectiveness of internal auditing, internal auditors must adopt an attitude of independence, objectivity and freedom from conflicts of interest in the exercise of their professional responsibilities.

The results of hypothesis testing indicate that there is a positive impact of internal auditor competence on internal audit effectiveness. This indicates that the higher the level of auditor competence, the greater the effectiveness of internal auditing. The level of competence of internal auditors can be observed from indicators that include professional experience and the number of hours of audit training. When these indicators show a high level, the internal audit function will be more effective. This is borne out by the descriptive statistics of the research, which show that the mean value of responses to the management support variable is higher than the theoretical mean value, and that the mean value of responses to the internal audit effectiveness variable is also higher than the mean value of the theoretical range.

These findings support the research conducted by Alzeban and Gwiliam (2014). Udeh and Nwadialor (2016), Saputra et al. (2020), Al-Twaijry et al. (2003) and Ratnawati (2020) who assert that the competence of internal auditors has a significant impact on the effectiveness of public sector internal audits. The results of this hypothesis test also show that to increase the effectiveness of public sector internal auditing, the director in state-owned companies with market activities as the organization's most senior executive must increase the competence of internal auditors by increasing the number of trained internal auditors so that they have the capacity and professional skills to carry out their tasks and responsibilities.

The third hypothesis test shows the result that there is a positive impact of management support on internal audit effectiveness. This indicates that the greater the management support for internal auditing, the higher the effectiveness of internal auditing. High management support for internal auditing can be observed from indicators that include management support for internal auditors in carrying out their duties and responsibilities, involvement in internal audit planning, management response to internal audit reports and internal audit department resources. When these indicators are high, the internal audit function will be more effective. This is borne out by the research's descriptive statistics, which show that the mean value of responses to the management support variable is higher than the theoretical mean value, and then the mean value of responses to the internal audit effectiveness variable is also higher than the mean value of the theoretical range.

These findings support the research conducted by Mihret and Yismaw (2007), Alzeban and Gwiliam (2014), Kagaba and Mulyungi (2016), Mupeta (2017) and Saputra et al. (2020), which asserts that management support for internal auditing has a positive impact on the effectiveness of internal auditing in public organizations. This empirical finding also shows that to increase the effectiveness of internal auditing in the public sector, the director in public companies with market activities, as the most senior manager in the organization, must increase support for the internal audit function, which is manifested in the involvement of regional directors in internal audit planning, the availability of a sufficient budget in the execution of tasks and the internal audit function, and the responses of internal auditors in public companies with market activities to the internal audit report.

The results of the moderation hypothesis test indicate that the cooperative relationship between internal and external auditors can reinforce the positive impact of independence on internal audit effectiveness. On the other hand, the impact of the other two variables, namely competence and management support on effectiveness, is not moderated by the cooperative relationship between internal and external auditors. The level of the relationship between internal auditors can be observed from indicators that include attitude towards external auditors, coordination, discussion of the audit plan, level of confidence of external auditors in internal audit work, frequency of meetings, sharing of working documents. Descriptive statistics show that respondents' answers lead to a low level of exchange indicators between internal and external auditors concerning audit activities, communication between internal and external auditors in each audit conducted by external auditors, and working document sharing activities between internal and external auditors. This is evident from the descriptive statistics, which show that the actual value of the auditor relationship variable ranges from 17 to 50, with a mean value of 33.04, and that the theoretical value of the range is between 10 and 50, with a mean value of 31 and a standard deviation of 5.42. This is probably why hypotheses 5 and 6 are not validated.

4. CONCLUSION: MAIN CONTRIBUTIONS, LIMITATIONS AND PROSPECTS

4.1. Key research findings

This research is based on the main idea that to improve the effectiveness of internal auditing, competence, independence, management support and cooperation with external auditors are required. The results showed that greater internal audit independence has a positive impact on internal audit effectiveness.

The quantitative method used, via the PLS-SEM approach, has enabled us to propose operational definitions that take into account the multidimensional aspect of both independent and dependent variables.

The results showed that the competence of internal auditors has a positive impact on the effectiveness of internal auditing. This confirms the agency theory, according to which internal auditors, as agents, must carry out the audit process at a professional level that requires professional training and certification, experience and other skills necessary to properly discharge their responsibilities. Greater management support for internal auditing has a positive impact on the effectiveness of internal auditing. At the same time, the test results show that the cooperative relationship does not enhance the impact of management skills and support on the effectiveness of the internal audit function.

4.2. Research prospects

These results indicate that the cooperative relationship is still limited to increasing aspects of independence, while formal aspects such as knowledge transfer and management support still need to be improved. The *outputs of* our study suggest highlighting these formal aspects as avenues for future research. The novelty of this study is to add a moderating variable, namely the cooperation of internal and external auditors in the research model.

4.3. Search limits

At the end of this doctoral research, and in addition to the richness of the contributions we have made, it is important to admit that it is not without its limitations. Our main limitation is that the estimation of structural model parameters using the PLS method is only approximately accurate, mainly because measurement errors are not taken into account. Consequently, estimates only become asymptotically correct under a double consistency condition (McDonald, 1996): the sample size must be very large, and the number of indicators per variable must also be very large. In practice, "these conditions are almost never met", with the result that structural models tend to be underestimated and the contributions of indicators to constructs overestimated (loadings).

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