

THE EFFECTIVENESS OF AUDIT COMMITTEES AND AUDIT QUALITY IN MITIGATING REAL EARNINGS MANAGEMENT: EVIDENCE FROM MANUFACTURING COMPANIES

Fitri Nurjanah *, Bandi **, Payamta **, Jaka Winarna **

* Corresponding author, Department of Accounting, Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia
Contact details: Universitas Sebelas Maret, Jalan Ir. Sutami 36A, Kentingan, Jebres, Surakarta, Jawa Tengah 57126, Indonesia

** Department of Accounting, Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia



Abstract

How to cite this paper: Nurjanah, F., Bandi, Payamta, & Winarna, J. (2025). The effectiveness of audit committees and audit quality in mitigating real earnings management: Evidence from manufacturing companies [Special issue]. *Journal of Governance & Regulation*, 14(2), 234–243. <https://doi.org/10.22495/jgrv14i2siart2>

Copyright © 2025 The Authors

This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0).
<https://creativecommons.org/licenses/by/4.0/>

ISSN Online: 2306-6784
ISSN Print: 2220-9352

Received: 18.08.2024
Received: 05.11.2024; 17.04.2025
Accepted: 16.05.2025

JEL Classification: G3, M42
DOI: 10.22495/jgrv14i2siart2

The purpose of this study is to explain, on the one hand, the effect of audit committee effectiveness measured using a composite index that captures the committee's size, expertise, independence, and diligence on real earnings management. On the other hand, this study aims to investigate the moderating role of audit quality in the relationship between audit committee effectiveness and real earnings management. Using a sample of 625 firm-year observations from 2018 to 2022, we investigate the impact of audit committee effectiveness and audit quality on real earnings management. The results show that audit committee effectiveness has a significant negative impact on real earnings management, and this effect is strengthened when audit quality is high. These findings highlight the importance of both internal and external governance mechanisms in constraining opportunistic behavior by managers. The study contributes to the corporate governance literature by providing evidence on the complementary roles of audit committees and external auditors in enhancing financial reporting quality in an emerging market setting. The findings also have implications for regulators, investors, and other stakeholders who are interested in promoting effective governance practices and reducing earnings management.

Keywords: Audit Committee Effectiveness, Audit Quality, Real Earnings Management

Authors' individual contribution: Conceptualization — F.N., B., and P.; Methodology — F.N. and B.; Validation — F.N.; Formal Analysis — F.N., B., and P.; Investigation — F.N. and P.; Data Curation — F.N.; Writing — Original Draft — F.N. and P.; Writing — Review & Editing — B. and J.W.; Supervision — F.N.; Project Administration — F.N.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

Both researchers and industry professionals continue to focus on earnings management as a hot topic. Many Indonesian businesses, including some not part of state-owned enterprises, have adopted the practice of profit management. These include PT Kimia Farma, PT Indofarma, PT Katarina Utama,

and PT Inovisi Infracom. The topic of earnings management and financial report manipulation is brought up by a case that happened at PT Garuda Indonesia Tbk. Garuda Indonesia's profit management case occurred in the 2018 financial report, when Garuda Indonesia reported a profit of USD 809 thousand, even though operationally, it actually experienced a loss. This case began with

the recognition of income from a cooperation contract with PT Mahata Aero Teknologi, which should not have been recorded because it had not been fully received. Two Garuda commissioners refused to sign the financial report because they saw accounting manipulation (Pridehan et al., 2024).

Indonesia has strong profit management practices, which is significant since it is part of a cluster of nations with adequate investor protection (Leuz et al., 2003). Earnings management is still present in the financial accounts of Indonesian stock market corporations (Adiasih & Kusuma, 2012). Manufacturing companies in Indonesia in 2011 as much as 82% practiced earnings management (Dwiadnyana & Jati, 2014, p.170). Small investors are unable to defend themselves against the dominance of majority shareholders due to a lack of legislative protection, high levels of concentration, and family ownership structures (Lukviarman, 2001). Such capital market conditions provide an opportunity for information asymmetry to arise, if it arises due to capital hazard, it can trigger opportunistic earnings management practices (Scott & O'Brien, 2019).

Up until now, accrual earnings management has been the subject of the majority of earnings management research. Among managers, accrual earnings management is less common than real earnings management (Graham et al., 2005). Research by Cohen and Zarowin (2010) found that companies that previously carried out accrual earnings management to improve performance will change to real earnings management in the following period. Some researchers have highlighted real earnings management among them (Braam et al., 2015; Chi et al., 2011; Cohen & Zarowin, 2010; Ricapito, 2024; Roychowdhury, 2006).

Good company governance practices may help prevent conflicts induced by knowledge asymmetry. Businesses may reduce the prevalence of information asymmetry and, by extension, earnings management tactics, by instituting strong corporate governance standards. In accordance with sound corporate governance principles, the audit committee is tasked with advising the board of commissioners on matters pertaining to accounting policies, overseeing internal and external controls, and the financial reporting procedures (Arun et al., 2015; Bédard & Gendron, 2009; Hasnan et al., 2022; Payamta et al., 2024; Sun et al., 2011; Suryandari et al., 2024; Zalata et al., 2018). In addition, the audit committee is in charge of resolving conflicts of interest and managing the company's revenues (Al-absy et al., 2018).

This study aims to investigate the effect of audit committee effectiveness on real earnings management. To further account for the aforementioned relationship, this paper extends previous studies to draw attention to the moderating effect of audit quality on the relationship between audit committee effectiveness and real earnings management in the Indonesian context. Indeed, despite widespread recognition of the importance of audit quality, there is a gap in the empirical literature examining the moderating effect of this factor. This will help companies improve audit quality and avoid earnings management problems. Therefore, audit quality plays an important role in resolving issues caused by conflicts of interest between companies and their shareholders.

This study can provide a theoretical understanding of how internal and external good

corporate governance (GCG) mechanisms play a role in controlling management behavior, especially related to earnings management. Internal mechanisms (audit committee effectiveness) and external mechanisms (or external auditors) are considered as factors that can mitigate earnings management actions. This study can strengthen or update the theory by adding empirical evidence on how internal and external GCG mechanisms work in mitigating conflicts of interest between agents (management) and principals (shareholders). If the GCG mechanism is proven effective, it confirms the assumption of agency theory that control mechanisms are needed to reduce information asymmetry and conflicts of interest.

The difference between this research and previous research (Abdullah & Ismail, 2016; Al-Thuneibat et al., 2016; Imen & Anis, 2021; Nasution & Jonnergård, 2017; Qamhan et al., 2018; Wan Mohammad & Wasiuzzaman, 2020; Zgarni et al., 2016) is to use audit quality as a moderating variable to enhance the audit committee's supervision of earnings management. The two internal and external oversight mechanisms work in tandem to support one another's roles in corporate governance.

The remainder of this paper is organized as follows. Section 2 reviews the literature and develops hypotheses regarding audit committee effectiveness, audit quality, and earnings management. Section 3 presents research methods and data, while Section 4 discusses the empirical findings, Section 5 reports our robustness checks. Finally, Section 6 summarizes the research and draws some conclusions.

2. LITERATURE REVIEW

2.1. Agency theory

According to Jensen (1993), there have been two main schools of thinking within agency theory since its beginnings in information economics: 1) positivism and 2) principal-agent. A unit of analysis that incorporates both streams is the contract between the principal and the agent. In the perspective of positive agent theory, the positive school is very concerned with the description of governance mechanisms that solve agency problems. Positive researchers focus on identifying situations where principals and agents tend to have conflicts of interest and then explaining governance mechanisms that limit agent behavior in terms of self-interest (Clarke, 2004).

According to Clarke (2004), the agency model that uses positive agency theory has two proportions related to governance mechanisms. Contracts based on outcomes effectively reduce agent opportunism in the first percentage. First, since the relationship for the principal and the agent are dependent on the same behavior, the reasoning goes, the contract brings their preferences into harmony. Consequently, this technique may help principals and agents avoid conflicts of interest. Second, information systems will put a limit on agents' ability to take advantage of situations. The reasoning for this is that the principal is kept informed about the agent's activities via the information system, which also helps to prevent the agent from being deceived by his opportunistic nature (Ricapito, 2024).

This study presents a foundational argument for understanding both internal and external governance processes in earnings management monitoring via its bundle of governance theory. While independent auditors handle the external governance system, the board of commissioners oversees the internal process via an audit committee that appoints. We anticipate that the combined effects of these two governance measures will make profit management monitoring more effective.

The audit committee has an important role in ensuring the quality of the company's financial records and compliance with applicable laws and standards. The audit committee conducts an examination of the financial reporting process, internal control system, and risk management. To ensure an independent and objective audit, they also engage in communication with both internal and external auditors. In addition, the audit committee is fully committed to observing and evaluating business policies and procedures, including anti-corruption and ethics codes. In this way, they serve as critical observers to monitor transparency and accountability in the business's operations.

2.2. Audit committee effectiveness and earnings management

The agency problem faced by the company is the conflict between the agent and the principal. One way that can be done is to align the conflicts faced by principals and agents through good corporate management. Corporate governance is one to control opportunistic that can be done by management (Siregar & Bachtiar, 2005). One of the governance mechanisms that can be used to address agency conflicts is the audit committee.

The board of commissioners of a corporation is the highest management body in charge of supervision under Indonesian corporate law. The board of commissioners may establish subsidiary committees, such as an audit committee, to more effectively carry out its supervisory duties. The audit committee's work results in wise corporate policy decisions (Healy, 1985). In Indonesia, meeting the requirements set out by the Organization for Economic Co-operation and Development (OECD) is considered excellent corporate governance.

Corporate financial reporting may be improved, and the occurrence of false claims in financial statements can be reduced via the supervisory role when an audit committee is well-organized (Safari, 2017). Ensuring the precision and dependability of the financial reports is a crucial responsibility of the audit committee. When the management is in charge of generating financial reports, the audit committee closely monitors them (Qamhan et al., 2018). Because a well-functioning audit committee may enhance the quality of financial reporting, it might reduce the likelihood of managers engaging in profit management.

H1: Audit committee effectiveness has a negative effect on earnings management.

2.3. Audit quality, audit committee effectiveness, and earnings management

Abbott and Parker (2000) are researchers who looked at the relationship between the frequency of audit committee meetings and the auditor sector specialty and found that more frequent meetings were linked to a preference for better audit businesses. Because they respect this skill, audit committees that meet more often are more likely to choose external auditors with industry experience. Knapp (1987) claims that an audit committee made up of people with relevant experience in the event of an auditor-client disagreement is a better way to safeguard the credibility of auditors than a committee made up of people from a variety of backgrounds.

Piot and Janin (2007) delve into the audit committee's essential function in lifting audit standards and cutting down on earnings management. First things first: make sure you're in charge of all accounting decisions and financial reporting tasks. In addition, we may accomplish our second objective by making sure that the internal and external audits are well-coordinated and that the external auditors are not pressured by management (Mcmullen & Raghunandan, 1996). As a result, opportunistic earnings management may be limited thanks to the audit committee and the quality of the external auditors (Mardessi, 2022; Vafeas, 2005; Zgarni et al., 2016).

It is possible that the quality of the audit committee is correlated with the thoroughness with which an external auditor examines a company's financial reports. Internal audit committees monitor financial disclosures as an essential component of sound company governance (Joshi & Wakil, 2004). The involvement of certified auditors will improve the audit committee's ability to support the board of commissioners in ensuring the correctness of financial reports. As a neutral third party, an audit committee versed in finance may mediate disputes between auditors and firms (Zgarni et al., 2016). An external auditor is an unbiased third party with the requisite training and experience whose job it is to assess the company's financial statements from the outside looking in. As a representative of the board of commissioners, the audit committee assesses how well operations are carried out and audit results are evaluated.

H2: There is a positive effect of audit quality and audit committee effectiveness on earnings management.

3. RESEARCH METHODOLOGY

3.1. Population and sample

The population in this study are manufacturing companies listed on the Indonesia Stock Exchange (IDX) in 2017–2021. The selection of manufacturing companies in this study is because manufacturing companies are still vulnerable to earnings management. Manufacturing companies have complex operating systems with high product diversity, which ultimately affects the complexity of detecting earnings management practices so that management can carry out these practices. Therefore, a sample of 625 observations was taken from panel data collection of manufacturing companies (Table 1).

Table 1. Sample selection procedure

Sample criteria	2018	2019	2020	2021	2022
Manufacturing companies listed on the IDX	156	157	168	181	198
Inaccessible financial reports	31	32	43	56	73
Total	125	125	125	125	125
Total observations	625				

3.2. Research variables

Real earnings management (*REM*), a technique for controlling profitability via decisions to change the timing or structure of activities, investments, and financial transactions to impact the accounting system’s output, is the dependent variable in this study. Roychowdhury (2006) defines cash flow as the difference between actual operating activities and cash flow, real earnings management techniques include selling products at discounted prices, selling products with low-interest credit, concessional credit terms, production that exceeds market needs, and reducing discretionary costs to meet profitability targets.

There are three potential indicators of real profit management (Cohen et al., 2008).

$$\frac{Cfop_{i,t}}{Assets_{i,t-1}} = \alpha + \alpha_{1t} \left(\frac{1}{Assets_{i,t-1}} \right) + \beta_{1t} \left(\frac{Sales_{i,t}}{Assets_{i,t-1}} \right) + \beta_{2t} \left(\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} \right) + \varepsilon_{i,t} \tag{1}$$

2. *Discretionary cost estimation.* So, that we don’t have exceptionally low discretionary spending this year since sales are so high, we may represent the typical amount of discretionary spending as a linear function of trailing sales (Roychowdhury, 2006). Abnormal discretionary expenditure (*Discexp*)

$$\frac{Discexp_{i,t}}{Assets_{i,t-1}} = \alpha + \alpha_1 \left(\frac{1}{Assets_{i,t-1}} \right) + \beta_1 \left(\frac{Sales_{i,t-1}}{Assets_{i,t-1}} \right) + \varepsilon_{i,t} \tag{2}$$

3. *Production cost estimation.* In order to achieve a low cost of products sold and large profit margins, it is possible to decrease fixed overhead by producing more inventory than normal. But more inventory means a higher total cost of manufacturing as a percentage of sales. The cost of products sold plus changes in inventory equals production expenses. In period *t*, sales, inventory growth, and the lag of inventory growth are

$$\frac{Prod_{i,t}}{Assets_{i,t-1}} = \alpha + \alpha_1(1 - Assets_{i,t-1}) + \beta_1 \left(\frac{Sales_{i,t}}{Assets_{i,t-1}} \right) + \beta_2 \left(\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} \right) + \beta_3 \left(\frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} \right) + \varepsilon_{i,t} \tag{3}$$

Research involving independent variables, specifically the efficacy of the audit committee, is essential for safeguarding shareholder interests, ensuring trustworthy financial reporting, effective risk management, and strong internal controls (Lin et al., 2008). The effectiveness of the audit committee as determined by the composite index (*EFFAC*) is validated by the existence of these five attributes. The five combined attributes are audit committee size (*SAC*), audit committee expertise (*ACEXP*), audit committee independence (*IAC*), audit committee chair with accounting expertise (*ACCHX*), and audit committee persistence (*ACD*). A binary value of “1” or “0” is given to each characteristic of an effective audit committee using a scoring methodology. Five combined attributes are added up to determine an effective audit committee (Ali et al., 2018).

1. *Estimated cash flows from operating activities.* Accelerating sales and meeting current-year sales objectives may be achieved by lowering sales prices and offering more flexible credit conditions. Having said that, operational cash flow could be poor even with a large number of sales at reduced rates due to the lower cash inflow per sale compared to typical sales. The standard operating cash flow curve is a straight line that tracks revenues and their fluctuations over a certain time frame (Roychowdhury, 2006). The discrepancy between a company’s actual and anticipated rates of cash flow from operations for each year is known as abnormal operating cash flow, or *Cfop* (Cohen et al., 2008). But in this instance, a standardized residual defines the aberration (Chi et al., 2011), as in the following equation:

is the difference between the amounts of discretionary expenditures that actually occurred and those that were anticipated for each fiscal year (Cohen et al., 2008). On the other hand, the standard residual is used to characterize the anomaly in this instance (Chi et al., 2011), as in the following equation:

predicted to form a linear function that represents the usual rate of production costs (Roychowdhury, 2006). The variance between the actual and projected levels of production expenses for each firm-year is called overproduction (*Prod*) (Cohen et al., 2008). Nonetheless, the aberration in this instance is identified as a standardized residual (Chi et al., 2011), as in the following equation:

The moderating factors in this research include audit quality. Because industrial specialization auditors represent the audit experience of an auditor in the industrial sector, audit quality is used in this study as a surrogate for industrial specialization auditors. Industry specialization auditors are measured by a proxy for the concentration of auditor services in a particular field. This measurement method assumes that specialization in auditors is the result of experience in auditing large volumes of business in an industry (Jaggi et al., 2009).

The following regression model is estimated to test the hypotheses (Sharma et al., 1981):

$$REM_{i,t} = \alpha_0 + \beta_1 EFFAC_{i,t} + \beta_2 ROA_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LOSS_{i,t} + \varepsilon_{i,t} \tag{4}$$

$$REM_{i,t} = \alpha_0 + \beta_6 EFFAC_{i,t} + \beta_8 AUQ_{i,t} + \beta_9 ROA_{i,t} + \beta_{10} SIZE_{i,t} + \beta_{11} LEV_{i,t} + \beta_{12} LOSS_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$REM_{i,t} = \alpha_0 + \beta_{13} EFFAC_{i,t} + \beta_{14} EFFAC * AUQ_{i,t} + \beta_{15} AUQ_{i,t} + \beta_{16} ROA_{i,t} + \beta_{17} SIZE_{i,t} + \beta_{18} LEV_{i,t} + \beta_{19} LOSS_{i,t} + \varepsilon_{i,t} \quad (6)$$

where,

- *REM*: abnormal operating cash flow + abnormal production - abnormal discretionary expenses;
- *EFFAC*: audit committee effectiveness. Accumulated score based on the following criteria: 1) size of the audit committee, 2) skill of the committee members, 3) independence of the committee, and 4) the chairman's accounting background;
- *AUQ*: audit quality;
- *LOSS*: 1 if the company reports a loss, 0 otherwise;

- *LEV*: leverage, the proportion of total debt divided by the total sales of the previous year;
- *ROA*: return on assets, operating income after tax divided by total assets;
- *SIZE*: business size, natural logarithm of total assets.

4. RESULTS

PT Sat Nusapersada Tbk (PTSN) has a profit management value of -15.99969. PT Impack Pratama Industri Tbk (IMPC) has an earnings management value of 17.26552.

Table 2 provides descriptive statistics covering the following: 1) research variables, 2) total sample 3) their lowest and maximum values, 4) mean values, and 5) standard deviations. Table 2 provides a description of the research variables.

Table 2. Descriptive analysis results

Variable	N	Mean	Std. dev	Min	Max	
REM	625	0.2685662	7.939367	-15.99969	17.26552	
EFFAC	625	0.87808	0.1257649	0.6	1	
LEV	625	1.138582	2.988804	0.000304	40.82628	
ROA	625	0.046806	0.1749757	-2.640992	0.9209972	
SIZE	625	28.39687	2.130793	15.58156	33.49453	
EFFAC * AUQ	625	0.4064	0.4503104	0	1	
Dummy variable						
Variable	Score 1		Score 0		Total	
	N	Percent (%)	N	Percent (%)	N	Percent (%)
LOSS	149	23.84	476	76.16	625	100
AUQ	283	45.28	342	54.72	625	100

Source: Secondary data processing statistics.

Table 2 above shows that the *REM* variable has a maximum value of 17.26552 and a minimum value is -15.99969 while the average value is 0.2685662 shows that the majority of manufacturing companies have an average value of *REM* below the median value of 0.2685662. The *EFFAC* variable has a maximum value of 1 and a minimum value of 0.6 while the average value is 0.87808. This shows that the majority of manufacturing companies have an average *EFFAC* value above the median value (0.87808). Manufacturing companies have an average of 0.8, which means that the audit committee owned by the company can carry out its duties and responsibilities effectively.

With an average value of 1.138582, the variable *LEV* has a maximum value of 40.82628 and a minimum value of 0.000304. This indicates that the majority of manufacturing businesses have a debt ratio that is lower than the median, which is 1.13582. The *ROA* variable shows that the majority of manufacturing enterprises have a debt ratio that

is lower than the median. The *ROA* variable has a maximum value of 0.9209972 and a lowest value of -2.640992. The average value is 0.046806. The *SIZE* variable ranges from a low of 15.58156 to a high of 33.49453. The average value is 28.39687, indicating that most manufacturing enterprises have asset values above the median value of 28.39687.

The *LOSS* variable is seen from companies that experienced losses in that period. There were 149 companies that suffered losses of 23.84%, and 476 companies that did not experience losses in that period with 76.16%. The range of possible values for the *AUQ* is from 0 to 1. The proportion of businesses that employ specialist industrial auditors is 45.28%, whereas 342 businesses do not employ such auditors, accounting for 54.72% of all businesses. The *EFFAC * AUQ* variable may take on values between 0 and 1, with an average value of 0.4046, indicating that most manufacturing businesses have a value lower than the median of 0.4046.

Table 3. Normality test

Variable	Obs.	W	V	Z	Prob > z
REM	625	0.99793	0.853	-0.385	0.64980
AUQ	625	0.99529	1.940	1.609	0.05383
EFFAC	625	0.99558	1.820	1.453	0.07306
ROA	625	0.99770	0.947	-0.132	0.55263
LEV	625	0.99895	0.432	-2.037	0.97917
LOSS	625	0.99792	0.857	-0.374	0.64576

The normality test is carried out to see that the residuals are normally distributed. Table 3 shows that the prob > z value is less 0.05, which states that

the variables in the residual research are normally distributed.

Table 4. Multicollinearity test

Variable	VIF	1 / VIF
AUQ	1.01	0.086240
EFFAC	1.03	0.986240
ROA	1.16	0.858499
LEV	1.04	0.958452
LOSS	1.22	0.818417
Mean variance inflation factor (VIF)	1.08	

A good regression model must be free from symptoms of multicollinearity. Because multicollinearity is a correlation between independent variables. Table 4 shows that the VIF is less than 10, which means that the multiple linear

regression model is free of symptoms of multicollinearity.

Table 5. Heteroscedasticity test

Test	Value
Chi2(1)	0.04
Prob. > chi2	0.8366

The regression model does not show symptoms of heteroscedasticity if the p-value indicated by "prob > chi2" is > 0.05. Table 5 shows that the prob. > chi2 value is 0.8366, which shows that the model is free from symptoms of heteroscedasticity, also known as homoscedasticity.

Table 6. Moderation regression results

Variable	Model 1			Model 2			Model 3		
	Multiple linear regression			Moderation regression			Moderation regression		
	B	t	Sig.	B	Q	Sig.	B	t	Sig.
(Constant)	-1.391053	-0.29	0.776	-1.022806	-0.21	0.835	2.00397	0.38	0.702
EFFAC	-6.483892	-2.59	0.010	-6.386972	-2.54	0.011	-9.905604	-3.01	0.003
AUQ				-0.4435554	-0.70	0.482	-7.776174	-1.74	0.083
LEV	0.2041627	1.92	0.055	0.2078906	1.95	0.051	0.1974006	1.85	0.064
ROA	2.818434	1.47	0.143	2.77916	1.45	0.149	2.611531	1.36	0.175
SIZE	0.222343	1.51	0.133	0.2135294	1.44	0.150	0.2157244	1.46	0.146
LOSS	2.830438	3.51	0.000	2.810991	3.48	0.001	2.783644		0.001
EFFAC * AUQ							8.334294	1.65	0.099
Adjusted R ²	0.0388			0.080			0.0407		
F-values	6.04			5.11			4.78		
Sig.	0.000			0.000			0.000		

Source: Stata secondary data processing.

Table 6 displays the results of the panel data regression analysis test Model 1, which validates the EFFAC variable evaluated composite index when all five conditions are present. When the probability value is less than 0.05 (or 0.010) and the negative coefficient is -6.483892, it indicates that the effectiveness of the audit committee has an influence on the management of actual profits.

Total debt divided by total equity is used to calculate the LEV variable, often known as debt to equity. LEV has a considerable effect on real profits management in Model 1, with a probability value of less than 0.1, or 0.055, and a positive coefficient of 0.2041627. The ROA variable is obtained by dividing total assets by net income. Model 1 states that while the probability value is more than 0.05 (i.e., 0.143) and the coefficient is positive (2.818434), ROA has no discernible impact on actual profits management. In Model 1, despite having a positive coefficient of 0.222343, a probability value of > 0.05 (i.e., 0.133), and other pertinent attributes, SIZE had no discernible effect on real profits management. Model 1's LOSS has a considerable impact on actual profits management, as shown by a positive coefficient of 2.830438 and a value probability of less than 0.05, or 0.000.

In Table 6 of the panel data Model 2 regression analysis test, all five criteria are included in the EFFAC variable assessed composite index. The EFFAC probability value of 0.011 and negative coefficient of -6.386972 indicate that its efficacy is less than 0.05.

Industry specialization auditor proxies are used to quantify AUQ factors because they provide an overview of an auditor's expertise across many sectors. Real earnings management is not significantly impacted by AUQ, with a probability value > 0.05, or 0.482, and a negative coefficient of -0.4435554.

The LEV variable, sometimes referred to as debt to equity, is the ratio of total debt to total equity.

With a positive coefficient of 0.2078906 and a probability value less than 0.1 (i.e., 0.051), Model 2 shows that LEV significantly affects actual profit management. To compute ROA, divide total assets by net income. With a probability value larger than 0.05, or 0.149, and a positive coefficient of 2.77916, Model 2 shows that there is no statistically significant relationship between ROA and actual profits management. Take the SIZE variable, for example, which is determined by calculating the natural logarithm of each asset. SIZE had no effect on real earnings management in Model 2 (p < 0.05, coefficient = 0.2135294). The LOSS variable is measured by a dummy variable, which is ordinarily set to 0. When an organization suffers a loss, it changes to 1. Real profit management is severely impacted by the loss in Model 2, as shown by a positive coefficient of 2.810991 and a probability value of less than 0.05 (i.e., 0.001).

The panel data Model 3 regression analysis test results are shown in Table 6. Since all five features are present, this test confirms the validity of the composite index for the EFFAC variable. The efficacy of the audit committee and actual profit management have a negative connection (-9.905604), with a probability value of less than 0.05 (or 0.003).

We may evaluate the AUQ variable by using auditor proxies, which describe an auditor's experience in a variety of industries. AUQ has an impact on real profits management, with a probability value < 0.1, particularly 0.083, and a negative coefficient of -7.776174.

LEV, which has a probability value of less than 0.1 (or 0.064) and a positive coefficient of 0.1974006, is a key component of the third model that significantly influences actual profit management. Model 3's coefficient of determination of 2.611531 and probability value greater than 0.05, or 0.175, indicates that there is no statistically

significant relationship between *ROA* and actual earnings management. A company's size may be calculated using either its actual size or the natural logarithm of all of its assets. As shown by Model 3's positive coefficient of 0.2157244, which has a probability value greater than 0.05 (i.e., 0.146), *SIZE* has no effect on real profits management. When a firm incurs a loss, a *LOSS*-related dummy variable takes on the value 1 and remains at 0 otherwise. Model 3, which has a probability value less than 0.05, or 0.001, and a positive coefficient of 2.783644, demonstrates the significant influence that *LOSS* has on actual profits management.

Model 3's results indicate that real earnings management is positively impacted by the interaction variable between *AUQ* and *EFFAC*. The *EFFAC * AUQ* variable have a positive coefficient of 8.334294 and a probability value of 0.099, which is less than 0.10. These values indicate statistical significance.

5. DISCUSSION

5.1. The effect of audit committee effectiveness on real earnings management

The hypothesis *H1* is that actual earnings management is negatively impacted by an effective audit committee. The results of the statistical test corroborated the null hypothesis, which contends that genuine profit management is significantly harmed by the audit committee effectiveness. This and other data suggest that when audit committees are well-run, made up of people with the right kind of financial and accounting knowledge, and have regular meetings, firms are less likely to manipulate results.

This study's findings corroborate previous research showing that well-governed corporations with an efficient audit committee are better able to curb profits management (Badolato et al., 2014; Carcello et al., 2006; Carcello & Nagy, 2004; Choi et al., 2004; Kurniasih et al., 2021). An audit committee that is effective and carries out its duties well can improve the quality of the company's financial reporting (Safari, 2017). The audit committee can also minimize misstatements in financial reports because the audit committee assists the board of commissioners as a supervisor in internal control, both of which aim to lower the risk that the company faces.

The agency problem faced by the company is the conflict between the agent and the principal. One way that can be done is to align the conflicts faced by principals and agents through good corporate management. Corporate governance is one to control opportunistic that can be done by management (Siregar & Bacthiar, 2005). One of the governance mechanisms that can be used to address agency conflicts is the audit committee (Healy, 1985). The board of commissioners serves as a watchdog since it is the highest level of corporate governance in Indonesia. The board of commissioners may establish other committees, such as an audit committee, to carry out its supervisory responsibilities. The audit committee's efforts have led to wise corporate policy decisions. In order to be said to be superior, a company's corporate governance must meet the requirements set by the OECD that apply in Indonesia.

Better company financial reporting is possible with an efficient audit committee to ensure accurate

financial reporting by minimizing the possibility of oversight-related errors (Safari, 2017). Supervising and following the financial reporting process is a crucial responsibility of the audit committee. While under audit, the audit committee keeps a careful eye on management's financial reports (Qamhan et al., 2018). An effective audit committee may lower the possibility of managers participating in profit management as it may improve the caliber of financial reporting.

The Indonesian Audit Committee Association hopes to use this study as a resource for establishing sound corporate governance practices and formulating long-term strategies relating to the audit committee's and board of commissioners' respective roles and duties.

The effectiveness of the audit committee can reduce earnings management, which can affect various aspects of the company's economy, such as increasing investor confidence, better earnings quality, compliance with regulations, more effective risk management, and operational efficiency, all of which contribute to the company's financial health and long-term sustainability. Therefore, strengthening the function and role of the audit committee is an important step in creating a better financial reporting environment.

5.2. Interaction of audit quality and effectiveness of the audit committee on real earnings management

The counterargument claims that superior audits mitigate the impact of an effective audit committee on profit management. The *AUQ* variable is a pure moderator, according to the statistical test findings, but it may also have an independent value. When *AUQ* is high, an efficient audit committee has a greater influence on actual profit management.

The results show that having auditors as part of the governance structure makes for a more effective audit committee, which in turn has a bigger impact on managing actual earnings. It collaborates with the audit committee to fulfill its duties related to profit management. The results of this research provide credibility to a set of governance principles that determine that the effectiveness of the audit committee and the quality of audits themselves are two external mechanisms that need to work together to monitor profit management.

The favorable impact on earnings management is amplified when your audit committee consists of skilled auditors. The use of auditors with expertise in certain industries or subsectors improved the overall quality of auditors in this research. A competent auditor is determined by their industry specialization, according to the findings. Previous research has found the same thing established a correlation between auditor specialization in the industrial sub-sector and audit quality (Balsam et al., 2003). Superior auditing is possible with auditors who focus on a particular industry (Stein & Cadman, 2007). It is more likely that an auditor will be competent if they have worked with a certain kind of client industry before, have had technical training, and are committed to ongoing professional development.

A preference for higher-quality audit firms was associated with more frequent audit committee meetings, according to researchers who examined the interaction between auditor industry expertise and meeting frequency (Abbott & Parker, 2000).

Therefore, external auditors with industry knowledge are more likely to be selected by audit committees that meet more often. Knapp (1987) asserts that in the event of a dispute between an auditor and a client, a representative from a diversified background is less likely to provide credence to the auditor's position than an audit committee comprised of people with relevant experience.

Piot and Janin (2007) examine how important the audit committee is to improving the quality of audits and cutting down on earnings management practices. First, by continuing to be in charge of all accounting choices and financial reporting tasks. Second, we may accomplish our second purpose by making sure that external auditors are unaffected by management pressure and that internal and external audits are coordinated (Mcmullen & Raghunandan, 1996). This means that external auditor quality and the audit committee may keep opportunistic earnings management to a minimum (Lin & Hwang, 2010). Both the financial statement audit and the auditor's engagement with internal governance processes may help put a cap on earnings management (Sun & Liu, 2013).

An external auditor's in-depth review of the business's financial accounts might improve the relationship between the audit committee's performance and the financial statements. Having an internal audit committee that verifies how businesses disclose their financial information is a component of sound corporate governance (Joshi & Wakil, 2004). The audit committee's capacity to help the board of commissioners guarantee the accuracy of financial reports will be strengthened by the presence of competent auditors on the committee. A financially responsible audit committee may mediate a dispute between the company and the auditor (Almarayeh, 2024; Khan & Kamal, 2024; Zgarni et al., 2016). Reviewing the financial accounts of a business from an objective third party is the responsibility of an external auditor. A third party having the necessary education and expertise to conduct an audit objectively is known as an external auditor. The audit committee evaluates the efficacy of operations and the findings of audits on behalf of the board of commissioners.

Audit committee effectiveness and audit quality have a significant impact on earnings management practices, which influence various aspects of a company's economics. From increased investor confidence and market stability, better business decisions, operational efficiency, reduced risk, and lower cost of capital, to increased long-term competitiveness, all contribute to a company's financial health and sustainability. Thus, investing in strengthening the function and quality of audit

committees and audit processes is an important step to create a healthier and more reliable financial reporting environment.

6. CONCLUSION

This study provides empirical evidence on the effectiveness of internal and external monitoring mechanisms in mitigating earnings management practices in Indonesian manufacturing companies. The findings suggest that audit committees play a vital role in constraining opportunistic behavior by managers, and this role is enhanced when the company is audited by a high-quality external auditor. The results support the predictions of agency theory and the bundle of governance theory, which emphasize the importance of multiple governance mechanisms in reducing agency conflicts and improving financial reporting quality.

The study has several implications for corporate governance practices and policies in Indonesia. First, it highlights the need for companies to establish effective audit committees that have the necessary expertise, independence, and resources to fulfill their oversight responsibilities. Second, it underscores the importance of external auditors in providing an additional layer of monitoring and assurance on the financial reporting process. Third, it suggests that regulators and other stakeholders should continue to promote the adoption of best practices in corporate governance, such as those related to audit committee composition and auditor independence.

However, the study also has some limitations that should be acknowledged. First, the sample is limited to manufacturing companies listed on the IDX, which may limit the generalizability of the findings to other sectors or countries. Second, the measurement of audit committee effectiveness and audit quality relies on proxies that may not fully capture the underlying constructs. Third, the study does not consider other factors that may influence earnings management, such as ownership structure, board characteristics, or financial performance.

Despite these limitations, the study makes a valuable contribution to the literature on corporate governance and earnings management in emerging markets. It provides a foundation for future research that can explore the effectiveness of other monitoring mechanisms, such as internal audit or investor activism, and their interactions with audit committees and external auditors. It also highlights the need for more research on the determinants and consequences of earnings management in different institutional and cultural contexts.

REFERENCES

- Abbott, L. J., & Parker, S. (2000). Auditor selection and audit committee characteristics. *Auditing: A Journal of Practice & Theory*, 19(2), 46–66. <https://doi.org/10.2308/aud.2000.19.2.47>
- Abdullah, S. N., & Ismail, K. N. I. K. (2016). Women directors, family ownership and earnings management in Malaysia. *Asian Review of Accounting*, 24(4), 525–550. <https://doi.org/10.1108/ARA-07-2015-0067>
- Adiasih, P., & Kusuma, I. W. (2012). Manajemen laba pada saat pergantian CEO (dirut) di Indonesia [Earnings management during CEO change in Indonesia]. *Jurnal Akuntansi Dan Keuangan*, 13(2), 67–79. <https://jurnalakuntansi.petra.ac.id/index.php/aku/article/view/18458>
- Al-absy, M. S. M., Ismail, K. N. I. K., & Chandren, S. (2018). Accounting expertise in the audit committee and earnings management. *Business and Economic Horizons*, 14(3), 451–476. <https://www.ceeol.com/search/article-detail?id=689509>
- Ali, M. J., Singh, R. K. S., & Al-Akra, M. (2018). The impact of audit committee effectiveness on audit fees and non-audit service fees: Evidence from Australia. *Accounting Research Journal*, 31(2), 174–191. <https://doi.org/10.1108/ARJ-11-2015-0144>

- Almarayeh, T. (2024). Audit committees' independence and earnings management in developing countries: Evidence from MENA countries. *Journal of Financial Reporting and Accounting*. <https://doi.org/10.1108/JFRA-11-2023-0652>
- Al-Thuneibat, A. A., Al-Angari, H. A., & Al-Saad, S. A. (2016). The effect of corporate governance mechanisms on earnings management: Evidence from Saudi Arabia. *Review of International Business and Strategy*, 26(1), 2–32. <https://doi.org/10.1108/RIBS-10-2013-0100>
- Arun, T. G., Almahrog, Y. E., & Aribi, Z. A. (2015). Female directors and earnings management: Evidence from UK companies. *International Review of Financial Analysis*, 39, 137–146. <https://doi.org/10.1016/j.irfa.2015.03.002>
- Badolato, P. G., Donelson, D. C., & Ege, M. (2014). Audit committee financial expertise and earnings management: The role of status. *Journal of Accounting and Economics*, 58(2–3), 208–230. <https://doi.org/10.1016/j.jacceco.2014.08.006>
- Balsam, S., Krishnan, J., & Yang, J. S. (2003). Auditor industry specialization and earnings quality. *Auditing: A Journal of Practice & Theory*, 22(2), 71–97. <https://doi.org/10.2308/aud.2003.22.2.71>
- Bédard, J., & Gendron, Y. (2009). *Strengthening the financial reporting system: Can audit committees deliver?* <https://doi.org/10.2139/ssrn.1438150>
- Braam, G., Nandy, M., Weitzel, U., & Lodh, S. (2015). Accrual-based and real earnings management and political connections. *The International Journal of Accounting*, 50(2), 111–141. <https://doi.org/10.1016/j.intacc.2013.10.009>
- Carcello, J. V., & Nagy, A. L. (2004). Client size, auditor specialization and fraudulent financial reporting. *Managerial Auditing Journal*, 19(5), 651–668. <https://doi.org/10.1108/02686900410537775>
- Carcello, J. V., Hollingsworth, C. W., Klein, A., & Neal, T. L. (2006). *Audit committee financial expertise, competing corporate governance mechanisms, and earnings management*. <https://doi.org/10.2139/ssrn.887512>
- Chi, W., Liscic, L. L., & Pevzner, M. (2011). Is enhanced audit quality associated with greater real earnings management? *Accounting Horizons*, 25(2), 315–335. <https://doi.org/10.2308/acch-10025>
- Choi, J.-H., Jeon, K.-A., & Park, J. (2004). The role of audit committees in decreasing earnings management: Korean evidence. *International Journal of Accounting, Auditing and Performance Evaluation*, 1(1), 37–60. <https://doi.org/10.1504/IJAAPE.2004.004142>
- Clarke, T. (Ed.). (2004). *Theories of corporate governance: The philosophical foundations of corporate governance*. Routledge.
- Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics*, 50(1), 2–19. <https://doi.org/10.1016/j.jacceco.2010.01.002>
- Cohen, D. A., Dey, A., & Lys, T. Z. (2008). Real and accrual-based earnings management in the pre- and post-Sarbanes-Oxley periods. *The Accounting Review*, 83(3), 757–787. <https://doi.org/10.2308/accr.2008.83.3.757>
- Dwiadnyana, I. K. A., & Jati, I. K. (2014). Reaksi pasar atas manajemen laba pada pengumuman informasi laba [Market reaction to earnings management on earnings information announcements]. *E-Jurnal Akuntansi*, 7(1), 165–176. <https://ojs.unud.ac.id/index.php/akuntansi/article/view/8653/6445>
- Graham, J. R., Harvey, C. R., & Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*, 40(1–3), 3–73. <https://doi.org/10.1016/j.jacceco.2005.01.002>
- Hasnan, S., Eskandar, N. S. M., Mohamed Hussain, A. R., Al-Dhubaibi, A. A. S., Kamal, M. E. M., & Kusumaningtias, R. (2022). Audit committee characteristics and financial restatement incidence in the emerging market. *Corporate & Business Strategy Review*, 3(2), 20–33. <https://doi.org/10.22495/cbsrv3i2art2>
- Healy, P. M. (1985). The effect of bonus schemes on accounting decisions. *Journal of Accounting and Economics*, 7(1–3), 85–107. [https://doi.org/10.1016/0165-4101\(85\)90029-1](https://doi.org/10.1016/0165-4101(85)90029-1)
- Imen, F., & Anis, J. (2021). The moderating role of audit quality on the relationship between auditor reporting and earnings management: Empirical evidence from Tunisia. *EuroMed Journal of Business*, 16(4), 416–430. <https://doi.org/10.1108/EMJB-03-2020-0024>
- Jaggi, B., Leung, S., & Gul, F. (2009). Family control, board independence and earnings management: Evidence based on Hong Kong firms. *Journal of Accounting and Public Policy*, 28(4), 281–300. <https://doi.org/10.1016/j.jaccpubpol.2009.06.002>
- Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, 48(3), 831–880. <https://doi.org/10.1111/j.1540-6261.1993.tb04022.x>
- Joshi, P. L., & Wakil, A. (2004). A study of the audit committees' functioning in Bahrain: Empirical findings. *Managerial Auditing Journal*, 19(7), 832–858. <https://doi.org/10.1108/02686900410549394>
- Khan, S., & Kamal, Y. (2024). Corporate board, audit committee and earnings manipulation: Does the corporate regulation matter? An emerging economy perspective. *Corporate Governance*, 24(4), 831–864. <https://doi.org/10.1108/CG-01-2023-0013>
- Knapp, M. C. (1987). An empirical study of audit committee support for auditors involved in technical disputes with client management. *The Accounting Review*, 62(3), 578–588. <http://www.jstor.org/stable/247578>
- Kurniasih, D., Wijaya, S. S., & Setyoko, P. I. (2021). Public governance in accountability of village enterprise (BUMDes) management: A stakeholders perspective. *Journal Ilmu Sosial, Politik Dan Pemerintahan*, 7(2), 1–16. <https://doi.org/10.37304/jispar.v7i2.967>
- Leuz, C., Nanda, D., & Wysocki, P. D. (2003). Earnings management and investor protection: An international comparison. *Journal of Financial Economics*, 69(3), 505–527. [https://doi.org/10.1016/S0304-405X\(03\)00121-1](https://doi.org/10.1016/S0304-405X(03)00121-1)
- Lin, J. W., & Hwang, M. I. (2010). Audit quality, corporate governance, and earnings management: A meta-analysis. *International Journal of Auditing*, 14(1), 57–77. <https://doi.org/10.1111/j.1099-1123.2009.00403.x>
- Lin, Z. J., Xiao, J. Z., & Tang, Q. (2008). The roles, responsibilities and characteristics of audit committee in China. *Accounting, Auditing & Accountability Journal*, 21(5), 721–751. <https://doi.org/10.1108/09513570810872987>
- Lukviarman, N. (2001). *Key characteristics of corporate governance: The case of Indonesia* (Working Paper). Curtin Graduate School of Business. <https://surli.cc/ijdmqb>
- Mardessi, S. (2022). Audit committee and financial reporting quality: The moderating effect of audit quality. *Journal of Financial Crime*, 29(1), 368–388. <https://doi.org/10.1108/JFC-01-2021-0010>
- Mcmullen, D. A., & Raghunandan, K. (1996). Enhancing audit committee effectiveness. *Journal of Accountancy*, 182(2). <https://www.proquest.com/openview/ba0258b42f302448b1656b39540e51fe/1.pdf?cbl=41065&pq-origsite=gscholar>

- Nasution, D., & Jonnergård, K. (2017). Do auditor and CFO gender matter to earnings quality? Evidence from Sweden. *Gender in Management*, 32(5), 330-351. <https://doi.org/10.1108/GM-06-2016-0125>
- Payamta, P., Sulistio, E. J. S., & Ardianingsih, A. (2024). The analysis of the characteristics of external auditor and audit committees: Tax avoidance. *Risk Governance and Control: Financial Markets & Institutions*, 14(2), 8-14. <https://doi.org/10.22495/rgcv14i2p1>
- Piot, C., & Janin, R. (2007). External auditors, audit committees and earnings management in France. *European Accounting Review*, 16(2), 429-454. <https://doi.org/10.1080/09638180701391030>
- Pridehan, S., Maharani, V., Pane, E. N., Desi, D., & Tarina, Y. (2024). Analisis hukum terhadap kewajiban laporan keuangan di pasar modal: Studi kasus manipulasi laporan keuangan PT Garuda Indonesia tahun 2018 [Legal analysis of financial reporting obligations in the capital market: Case study of PT Garuda Indonesia's financial report manipulation in 2018]. *Media Hulim Indonesia*, 2(4), 903-908. <https://ojs.daarulhuda.or.id/index.php/MHI/article/view/999>
- Qamhan, M. A., Che Haat, M. H., Hashim, H. A., & Salleh, Z. (2018). Earnings management: Do attendance and changes of audit committee members matter? *Managerial Auditing Journal*, 33(8-9), 760-778. <https://doi.org/10.1108/MAJ-05-2017-1560>
- Ricapito, F. P. (2024). Earnings management and corporate governance during COVID-19: Evidence from the European capital market. *Corporate Board: Role, Duties and Composition*, 20(1), 42-55. <https://doi.org/10.22495/cbv20i1art4>
- Roychowdhury, S. (2006). Earnings management through real activities manipulation. *Journal of Accounting and Economics*, 42(3), 335-370. <https://doi.org/10.1016/j.jacceco.2006.01.002>
- Safari, M. (2017). Board and audit committee effectiveness in the post-ASX corporate governance principles and recommendations era. *Managerial Finance*, 43(10), 1137-1151. <https://doi.org/10.1108/MF-07-2015-0185>
- Scott, W. R., & O'Brien, P. (2019). *Financial accounting theory* (8th ed.). Pearson.
- Sharma, S., Durand, R. M., & Gur-Arie, O. (1981). Identification and analysis of moderator variables. *Journal of Marketing Research*, 18(3), 291-300. <https://doi.org/10.1177/002224378101800303>
- Siregar, S. V., & Bachtiar, Y. S. (2005). Corporate governance, information asymmetry, and earnings management. *Jurnal Akuntansi dan Keuangan Indonesia*, 2(1), Article 4. <https://doi.org/10.21002/jaki.2005.04>
- Stein, M. T., & Cadman, B. D. (2007). *Industry specialization and auditor quality in U.S. markets*. <https://doi.org/10.2139/ssrn.722203>
- Sun, J., & Liu, G. (2013). Auditor industry specialization, board governance, and earnings management. *Managerial Auditing Journal*, 28(1), 45-64. <https://doi.org/10.1108/02686901311282498>
- Sun, J., Liu, G., & Lan, G. (2011). Does female directorship on independent audit committees constrain earnings management? *Journal of Business Ethics*, 99, 369-382. <https://doi.org/10.1007/s10551-010-0657-0>
- Suryandari, D., Hidayah, R., Ranihusna, D., Aulia, I., Basher, S. R., Kayati, I. N., Hasna, S. I., Nugraha, S. A. A., & Rohmah, F. T. (2024). Is the board of directors associated with earnings management strategy? The role of the audit committee. *Corporate Board: Role, Duties and Composition*, 20(2), 8-19. <https://doi.org/10.22495/cbv20i2art1>
- Vafeas, N. (2005). Audit committees, boards, and the quality of reported earnings. *Contemporary Accounting Research*, 22(4), 1093-1122. <https://doi.org/10.1506/1QYN-2RFQ-FKYX-XP84>
- Wan Mohammad, W. M., & Wasizzaman, S. (2020). Effect of audit committee independence, board ethnicity and family ownership on earnings management in Malaysia. *Journal of Accounting in Emerging Economies*, 10(1), 74-99. <https://doi.org/10.1108/JAEE-01-2019-0001>
- Zalata, A. M., Tauringana, V., & Tingbani, I. (2018). Audit committee financial expertise, gender, and earnings management: Does gender of the financial expert matter? *International Review of Financial Analysis*, 55, 170-183. <https://doi.org/10.1016/j.irfa.2017.11.002>
- Zgarni, I., Hlioui, K., & Zehri, F. (2016). Effective audit committee, audit quality and earnings management: Evidence from Tunisia. *Journal of Accounting in Emerging Economies*, 6(2), 138-155. <https://doi.org/10.1108/jaee-09-2013-0048>