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Abstract: The study aims to investigate the asymmetric cost behavior in non-financial MENA companies and the influence of earnings management on cost stickiness. Also, the study investigates if cost stickiness is influenced by industry, economic transitions, and the companies' characteristics. Using a sample of non-financial listed companies in ten MENA countries during 2010-2019, the results reveal sticky costs behavior and detect significant cost stickiness in the non-earnings sub-sample compared with the earnings management sub-sample, which points to that management choose to decrease expenses under the pressure of achieving earning target. The findings support prior related literature about the effect of GDP, asset intensity, debt intensity, and free cash flow on sticky cost behavior, but no evidence supports the effect of industry and successive decrease factors on cost behavior.

Keywords: Cost behavior, Earnings management, MENA, Sticky cost.

1 Introduction

The cost accounting literature assumed variable costs to move proportionately with operating activities. This behavior is known as symmetric in the traditional management accounting literature. Anderson, Banker [1] proved that managing resources and adjusting costs by management may affect cost structure to be asymmetric behavior. This non-traditional cost behavior is remarked later as sticky or anti-sticky cost behavior depending on the magnitude change of costs compared to the change of revenues.

However, the management motivations to meet earning targets and analysis expectations can play a vital driver to cut slack resources as a response to revenue decrease [2,3]. Consequently, earnings management will affect the cost structure behavior by reducing cost stickiness or making it anti-stickiness cost behavior [4-6].

This study examines the asymmetric cost behavior in non-financial MENA companies and the influence of earnings management on cost stickiness. Also, the study investigates if cost stickiness is influenced by industry, economic transitions, and the companies' characteristics. Using Thomson Reuters Datastream for collecting ten years of data (2010-2019) from different MENA countries; the results reveal sticky costs behavior and detect significant cost stickiness in the non-earning sub-sample compared with the earnings management sub-sample.

The study results provide clear perceptions for the financial and management accounting literature, since a good understanding of cost behavior is essential for performance evaluation, controlling, decision-making process, and budgeting. Also, the study contributes to cost stickiness literature by offering evidence on the effect of earnings management on cost behavior. Moreover, the study provides a further contribution to the literature by exploring the effect of the economic, agency problem, industry, and other specific characteristics on cost behavior in emerging markets, because no prior studies captured all these factors in MENA countries

The rest of the study is organized as follows. Section 2 reviews the literature and formulate study hypotheses. Section 3 explains the methodology, including data and models. Results are offered in section 4 and followed by conclusions in section 5.

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2 Theory and hypotheses development

The traditional model of cost behavior divides costs into variable costs and fixed costs components. This model assumes that variable costs change in proportion to the change in the volume of activity, while fixed costs remain unchanged within the relevant range. However, the traditional cost model has a set of deficiencies in a way that limits its validity in explaining the behavior of some types of costs (e. g. operating expenses).

Several studies in the last two decades [7-11] provided empirical evidence that some types of cost mostly have asymmetric behavior, which contrary to what was stated in the traditional model. Anderson, Banker [1] sparked academic interest in a new model for understanding cost behavior that focuses on the abnormal behavior of cost elements and the response of asymmetric cost elements to changes in the volume of activity. This seminal work documented the existence of cost asymmetry and established the term "cost stickiness" to describe this new phenomenon. Cost stickiness is a phenomenon that occurs when a company's activity decreases by 1% but its costs decrease by less than 1%. Anderson, Banker [1] found that when revenue rise by 1 percent; SG&A rises by 0.55 percent, whereas when revenue decreased by 1 percent; SG&A decreased by 0.35 percent.

As a result of Anderson, Banker [1]'s cost stickiness phenomenon; a new line of research has been created across different cost types, firms, countries, and industries [3, 11-14]. However, cost behavior is not supposed to be sticky in all situations; no stickiness or anti-stickiness has been proved in the literature. Anti-stickiness occurs if cost increase less when activity rises than they decrease when activity decrease. For example, Kama and Weiss [2], Banker, Byzalov [15] and Cohen, Karatzimas [4] documented anti-sticky behavior. Özkaya [11] found that firms, industries, and cost types have sticky, anti-sticky, and no stickiness cost behavior in different percentages. Anderson, Banker [16] found that less competitive service companies and more concentrated manufacturing companies have a higher level of cost stickiness. Abu-Serdaneh and Ghazalat [17] found that GCC countries have sticky cost behavior on average, but individual countries have sticky, anti-sticky, or no stickiness cost behavior.

As a result, based on the evidence from the aforementioned studies, it is concluded that the untraditional cost behavior phenomena should prevail. The following hypotheses will be used to determine whether asymmetric cost behavior exists in MENA countries:

H1: The asymmetric cost behavior prevails in MENA countries.

H2: The asymmetric cost behavior changes across industries.

Prior literature clear evidence between the degree of asymmetric cost behavior and earning management. [2] found that firms that engaged in earnings management had a small amount of cost stickiness in their operating expenses. They showed that deliberate managerial decisions taken to achieve earnings targets reduce cost stickiness rather than inducing it. They discovered that when managers are faced with the temptation to prevent losses or meet analyst expectations, they speed up the process of reducing slack resources when sales are declining. Similar results were found by Xue and Hong [18]; they found small sticky cost significance in the earnings management sub-sample, but they discovered a much larger amount of sticky cost in the non-earnings management sub-sample. They eventually concluded having an inverse relationship between sticky cost behavior and earnings management.

The dramatic decrease in a firm's earnings motivates management to cut costs to prevent losses and earnings decrease, which reduces cost stickiness or may make cost behavior anti-stickiness. The impact of cutting costs intentionally by management to meet earnings targets or meet analysts' forecasts on the stickiness degree has been examined and proved in prior literature. Chen, Kama [19] and Han, Rezaee [20] found evidence of the negative association between cost stickiness and management earning forecast. Silva, Zonatto [5] and Ballas, Hevas [3] observed that the asymmetric cost behavior is affected by earning management. They proved that the manager's motivation to meet targets leads to a rapid reduction in resources, which results in more cost reductions and minimizes cost stickiness.

The literature also examined the amount of earning reduction that motivates management to accelerate cost reduction. When the earning is close to zero, this is considered a benchmark for earning management as mentioned in prior literature [2, 18, 21] for different reasons [21-23]. First, positive profit is an important indicator to stakeholders; such as suppliers and employees that the company can pay its obligations, owners that the company can meet its legal requirements and pay dividends, and bonuses to managers. Second, exceeding the zero earnings goal helps to avoid debt covenant violations and prevents creditors from interfering in the company's management. Third, revealing losses for more than one year creates a going concern issue, which may harm the company's creditworthiness. These reasons motivate management to manage earnings to avoid loss reporting by accelerating cost reduction, which affects asymmetric cost behavior and reduces cost stickiness.

Based on this argument; the study will examine the following hypothesis to test the effect of earning management on

asymmetric cost behavior:

H3: In the case of MENA companies, earning management affects the level of asymmetric cost behavior.

In the last two decades, extensive literature examined economic conditions and characteristics of asymmetric cost behavior. The literature considered growth factor as the intensity of asymmetric cost behavior since it reflects the level of macroeconomic activity and management expectations for future sales. Management is more likely to consider a drop in demand temporary when substantial economic growth is anticipated than when poor or negative economic growth is expected. These optimistic managerial expectations may lead to a delay in cutting adjustment costs and increase the sticky cost [1].

Accordingly, the following hypothesis will be used to examine the effect of growth on the asymmetric cost behavior:

H4. The asymmetric cost behavior is affected by changes in the GDP growth rate.

Empire building incentives for management are another determinant of cost behavior. Different proxies were applied to measure managers' empire building (e. g. Free cash flow, CEO horizon, CEO tenure, and compensation structure), but free cash flow was the most used in the literature. The studies of Calleja, Steliaros [12], Chen, Lu [9], and Ballas, Hevas [3] found a positive relationship between empire-building incentives measured by free cash flow and the asymmetric cost level.

 Asset intensity, debt intensity, and management expectations for future revenue are other determinants of asymmetric cost behavior. Many follow-up studies investigated these determinants, and provide empirical evidence of the effects of these determinants and the degree of cost stickiness [2, 3, 9, 15, 24-26].

Asset intensity is used as a proxy of the magnitude of adjustment costs, since when the company performance is reduced results reducing of fixed assets. However, disposing of assets will increase the company's costs if the drop in performance is temporary [1]. A company with a high level of debt has an incentive of reducing the cost to avoid loss and avoid creditor scrutiny [12], which reduces cost stickiness. This incentive is similar to the situation of revenue decreases in two successive periods that management expects for future revenue.

3 Data and models

The study used data from Thomson Reuters Datastream for non-financial listed companies in ten MENA countries. The sample covers the years 2010-2019 and consists of 4680 firm-year observations. Some MENA countries are excluded because of wars and unstable political situations (e. g. Syria, Iraq, Yemen, Libya) or because of unavailable data. An excluding of financial companies because they have a different business model from other non-financial firms, which present different operations about asymmetric costs [27], Table (1) shows samples details

Table 1: Study Sample Details

Country	# of companies	Observations	Percentage
Jordan	73	657	0.140
Bahrain	15	135	0.029
Egypt	81	729	0.156
Kuwait	55	495	0.106
Morocco	34	306	0.065
Oman	57	513	0.110
Qatar	19	171	0.037
Saudi Arabia	106	954	0.204
Tunisia	38	342	0.073
United Arab Emirates	42	378	0.081
total	**520**	**4680**	**100%**

To examine asymmetric cost behavior, most related literature used Anderson, Banker [1] model. This model calculates the magnitude of the difference in SG&A concerning revenue variations. The basic model used in the study is similar to [1] model and given by equation (1):

$$\text{Ln} \frac{SG\&A_t}{SG\&A_{t-1}} = B_0 + B_1 * \text{Ln} \frac{Revenu_t}{Revenue_{t-1}} + B_2 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} + e \qquad (1)$$

The Decrease Dummy is an indicator variable that takes the value of 1 when revenue decrease (when revenues in period t decrease from period t-1) and 0 otherwise. B1 is the percentage increase in SG&A for a 1% increase in revenue. B2 is the main indicator of asymmetric cost behavior; when B2 is significant and negative indicates sticky cost behavior, but

if it is positive and significant indicates anti-sticky cost behavior. In the case of decreasing revenue (Decrease Dummy = 1); summation of B1 and B2 is the percentage decrease in SG&A for a 1% decrease in revenue.

The study applied a zero-earning benchmark as a strong motivation to manage earnings by management. Therefore, the study sample was divided into two sub-samples, small positive profit observations that have ROA range 0-1.5 percentage is earning management sub-sample, and non-earning management sub-sample. Another measurement of small profit observations that have changed in earning range 0-1 percentage. Combining observations that have a small range of ROA and small change in earning together provides the final earning management sub-sample.

The study extends Model (1) to include the level of macroeconomic activity and company characteristics to shed light on its association with asymmetric cost behavior. The growth factor and four company characteristics are included in Model (2). Growth is measured by GDP, while asset intensity is measured by PPE scaled by revenue (PPERev), debt intensity measured by financial leverage ratio (FinL), empire building measured by free cash flow (FCF), and the successive decrease dummy variable (SuccD), that take value 1 when revenue decline in two successive periods. All study's model variables and symbols summarized in table (2).

Table 2: Summary of study variables, symbols and measurements

Variables	Symbols	Measurements
Growth	GDP	quantities of all goods and services produced, multiplying them by their prices.
Asset intensity	PPERev	PPE scaled by revenue.
Debt intensity	FinL	total company debt/shareholder's equity.
Empire building	FCF	free cash flow.
Successive decrease	SuccD	dummy variable take value 1 when revenue decline in two successive periods, 0 otherwise.
Asymmetric cost behavior	B2	when B2 is significant and negative indicates sticky cost behavior, but if it is positive and significant indicates anti-sticky cost behavior.

$$\text{Ln} \frac{SG\&A_t}{SG\&A_{t-1}} = B_0 + B_1 * \text{Ln} \frac{Revenu_t}{Revenue_{t-1}} + B_2 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it}$$

$$+ B_3 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * GDP$$

$$+ B_4 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * PPERev$$

$$+ B_5 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * FinL$$

$$+ B_6 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * FCF$$

$$+ B_7 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * SuccD$$

$$+ B_8 * \text{Ln} \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * \text{Industry} + e \tag{2}$$

Tables (3) report a summary of descriptive statistics of the main variables applied in hypotheses testing, which provides initial exploration to the data before analysis. Table (3) displays that the mean (median) of Revenue and SG&A are $549.7 ($93) and $449 ($78.5) million, which indicates that the companies included in the sample are mostly large, but the companies in this sample considered smaller than Anderson, Banker [1] and Kama and Weiss [2] samples (mean revenue $1,277 and $1,809 million respectively). Also, the mean and median of Revenue and SG&A variables are right-skewed and the standard deviation is highly larger than the mean (Std. Dev. $2,390 million for revenue and $1,870 million for SG&A), which required regressing these variables and indicates high variations. In all other variables, the descriptive statistics showed no difference between the mean and median, but the standard deviation was still higher than the mean.

Table 3: Descriptive Statistics

	Mean	**Median**	**Std. Dev.**
ROA	0.045	0.0434	0.1460953
Revenue	549,755,050	93,226,802	2,390,000,000
SG&A	449,000,000	78,512,343	1,870,000,000
GDP	0.037	0.0349	0.035
PPE	684,001,392	55,620,843	4,331,251,553
Fin.L	0.44	0.41	0.29
FCF	-2,895,284	495,339	451,717,974

Table (4) shows that the frequency of observations that have revenue declines is 2009 observations (43%) compared with 27% in Anderson, Banker [1] and Kama and Weiss [2] samples. The observation with earning management incentive to avoid loss is 26.6% compared with 14% for Kama and Weiss [2] samples. At the same time, the observations that have a successive decrease in revenue are 22%. All these indicators point out that many companies in the sample face problems and have relatively low performance. Since there are three categories in the specific industry classification (manufacturing, service, and finance) and this study excluded the finance category. Table (4) presents manufacturing observations' frequency of 61% and utility observations compose 39% of the sample.

Table 4: frequencies of sub-samples and dichotomy variables

	Number of Observation	**Percentage of sample**
Decrease Dummy 1 - revenue decline	2,009	42.93%
Decrease Dummy 0 – non-revenue decline	2,671	57.07%
Earning Management sub-sample	1,246	26.62%
Non- Earning Management sub-sample	3,434	73.38%
Industry 1 – Manufacturing companies	2,844	60.77%
Industry 0 – Service companies	1,836	39.23%
Successive 1 – two years sequential decrease	1,032	22.05%
Successive 0	3,648	77.95%

4 Results

Table (5) presents the regression summary results for basic and extended models; the basic model testing the main sticky cost hypothesis, the second and third models testing earning management hypothesis, and the fourth is extended model for testing the effect of characteristics and control variables on sticky cost behavior.

The data type that used in this study is panel data. To determine which model would be appropriate (fixed effect, random effect, or pooled OLS); the Breusch-Pagan Lagrangian Multiplier (BPLM) test and Hausman test are used, and Table (5) presents the results of these tests. According to the results of the Hausman test; the value of Prob>chi2 = 0.0025 for earning management model, which means using fixed-effect model, while this value was more than 5% in all other models, which indicate using random-effect. Also, Breusch-Pagan's LM test is used to determine the appropriate model to be applied between pooled OLS model and the random-effects model. Breusch-Pagan's LM test results show that pooled OLS model is appropriate for the Basic, Non-EM, and extended model.

Basic Model:

$$\text{Ln}\frac{\text{SG\&A}_t}{\text{SG\&A}_{t-1}} = B_0 + B_1 * \text{Ln}\frac{\text{Revenu}_t}{\text{Revenue}_{t-1}} + B_2 * \text{Ln}\frac{\text{Revenue}_t}{\text{Revenue}_{t-1}} * \text{Decrease-Dummy}_{it} + e$$

Extended model:

$$\text{Ln}\frac{\text{SG\&A}_t}{\text{SG\&A}_{t-1}} = B_0 + B_1 * \text{Ln}\frac{\text{Revenu}_t}{\text{Revenue}_{t-1}} + B_2 * \text{Ln}\frac{\text{Revenue}_t}{\text{Revenue}_{t-1}} * \text{Decrease-Dummy}_{it}$$

$+ B_3 * Ln \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * GDP$

$+ B_4 * Ln \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * PPERev$

$+ B_5 * Ln \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * FinL$

$+ B_6 * Ln \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * FCF$

$+ B_7 * Ln \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * SuccD$

$+ B_8 * Ln \frac{Revenue_t}{Revenue_{t-1}} * \text{Decrease-Dummy}_{it} * Industry + e$

Where $\text{Decrease-Dummy}_{it}$ takes value 1 when revenue in year t is less than revenue in year t-1. GDP is the growth percentage in real GNP in year t. PPERev is asset intensity measured by PPE scaled by revenue. Fiona is debt intensity measured by the financial leverage ratio. FCF is empire-building measured by free cash flow. SuccD is successive decrease dummy variable takes value 1 when two years sequential decrease and 0 otherwise. The industry is a dummy variable taking values 1 for manufacturing companies and 0 for service companies.

Table 5: Regression results

coefficient	Variables	Basic Model	EM-model	Non-EM-Model	Extended model
		Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)
Constant		-0.0078 (-4.54)***	-0.0067 (-2.40)**	-.0083 (-3.94)***	-.0081 (-4.74)***
B1	LogREV/REVt1	0.6096 (43.25)***	0.7488 (26.66)***	0.5795 (35.70)***	.6092 (43.83)***
B2	SG&A -Sticky	-0.040 (-2.01)**	0.0079 (0.20)	-0.0508 (-2.22)***	-0.0999 (-2.87)**
B3	GDP				0.913 (1.91)*
B4	PPERev				-0.036 (-3.35)***
B5	FinL				0.288 (10.16)***)
B6	FCF				-0.0027 (-4.27)***
B7	SuccD				.0040 (0.12)
B8	Industrial				0.0005 (-0.14)
Adj. R2		0.4321	0.5399	0.4088	0.4469
F		1764.81	728.6	1174.87	534
Obs.		4637	1241	3396	4618
Hausman test x2		0.599	0.0025	0.1058	0.4448
Breusch-Pagan's LM		1	0.185	1	1
Modified Wald Test - ch2		2900000***	1.9E+38***	3.2E+36***	1.2E+31***
Wooldridge test (p-value)		0.9881	0.268	0.9332	0.7706

Note: *, **, *** indicate significance at 10%, 5%, and 1% respectively.

The diagnostic tests for multicollinearity, heteroscedasticity, and autocorrelation problems are performed. The results showed that all variables' values of Variance Inflation Factor (VIF) were between 1 and 10 which indicates no multicollinearity problem existing in all models. Also, correlation coefficient less than 80% for all independent variables based on the Pearson correlation test, which supports multicollinearity problem existing [28].

The Wooldridge test is used to check the autocorrelation problem. Table (5) shows that the P-values of the Wooldridge test are greater than 0.05 for all models, which indicates no autocorrelation problem exists. The Modified Wald test is

used to check the heteroscedasticity, in which the result indicates that all p-values for all models are less than 0.05, which indicate that all models suffer from heteroscedasticity problem.

The result of basic model present significant SG&A sticky cost behavior in MENA companies with B1 = 0.0609 (t = 43.25) and B2 = -0.40 (t = -2.01). Hence, an increase in revenue of 1% led to an increase SG&A of 0.60%, and decreasing in revenue of 1% leads to a decrease in SG&A of 0.56%. This significance of asymmetric cost behavior is consistent with prior literature on SG&A [1, 3, 4, 11, 12]. However, the change in SG&A is slightly when revenue decreases compared to previous studies. For example, Anderson, Banker [1] found that SG&A decreased by 0.35 percent per one percent decrease in revenue and increase by 0.55 percent per one percent increase in revenue, which means that the estimated B2 is (-0.2), while B2 = -0.12 in Tzillas [29] study, B2 = -0.06 in Calleja, Steliaros [12] study, and ranged between -0.04 to -0.16 in Özkaya [11] study.

Table (5) presents the second and third model results that test earning management hypothesis. The value of B2 in the Earning-management model is positive and not significant (0.007), compared with negative and significant value in the Non-earning management model (-0.0507) similar to basic model results, which supports prior literature assumption about decreasing sickness in the case of earning management sample [2, 3, 18, 21]. Thus, consistent with existing management motivation to meet analysts' forecasts and fulfill profitability targets by decreasing SG&A, which reduces the intensity of stickiness.

The study results confirmed that the cost stickiness is influenced by economic transitions and the companies' characteristics. The macroeconomic activity is measured with GDP in this study, Table (5) shows minor significance (at 10%) effect of growth on sticky cost behavior, indicating that improving the economy enhances stickiness behavior as a result of optimistic managerial expectations. Also, The results did not prove empirical evidence that industry and successive decrease variables affect cost stickiness.

The results also emphasize that companies' characteristics (assets intensity, debt intensity, and free cash flow) can affect cost behavior. The coefficient of asset intensity is negative and significant, which confirms theoretical and empirical evidence provided by Anderson, Banker [1], Calleja, Steliaros [12], Kama and Weiss [2], Özkaya [11], and Ballas, Hevas [3]. They found that companies that have high asset intensity have the intensity of sticky cost behavior because it is easy to reduce purchasing fixed resources in a time of declining revenue, but it is costly to dispose of existing resources.

The result of debt intensity characteristic is positive and significant, which indicates that the more companies with a high level of debt show less cost stickiness behavior because creditors push management to meet payments and to cut adjusting costs [4, 11, 12, 14]. The estimated coefficient of free cash flow that is used to capture agency problems and empire-building behavior is negative and significant, indicating that management incentives to meet earnings targets weaken cost stickiness, rather than provoke it. This direction of the relationship support Kama and Weiss [2] and Ballas, Hevas [3] results. They infer that depending on the underlying motivations, certain purposeful decisions increase sticky costs while others decrease sticky costs.

5 Conclusions

This study examined the asymmetric cost behavior in non-financial MENA companies and the influence of earning management on cost stickiness. Also, the study investigates if cost stickiness is influenced by industry, economic transitions, and the companies' characteristics. Using Thomson Reuters Datastream for collecting ten years of data (2010-2019) from different MENA countries; the study examined four models with different types of samples. Full sample to examine the existence of cost stickiness and different economic and companies' characteristics and two sub-samples to examine management incentives to meet earnings targets that affect cost stickiness behavior.

The study document that non-financial MENA companies reveal sticky costs behavior. The study finds that the non-earnings-management sub-sample has sticky cost behavior, while the earnings management sub-sample has no sticky cost behavior, which points to that management choose to decrease expenses under the pressure of achieving earning target. The findings support prior related literature about the effect of GDP, asset intensity, debt intensity, and free cash flow on sticky cost behavior, but no evidence supports the effect of industry and successive decrease factors on cost behavior.

This study makes the following contributions. First, it contributes to cost stickiness literature by offering evidence on the effect of earnings management on cost behavior. Second, the study provides a further contribution to the literature by exploring the effect of the economic, agency problem, industry, and other specific characteristics on cost behavior in emerging markets, because no prior studies captured all these factors in MENA countries. Third, the study results provide clear perceptions for the financial and management accounting literature, since a good understanding of cost

behavior is essential for performance evaluation, controlling, decision-making process, and budgeting.

Conflict of interest:

The authors declare that there is no conflict regarding the publication of this paper.

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