

THE DYNAMIC RELATIONSHIP BETWEEN BIG DATA ANALYTICS, BLOCKCHAIN TECHNOLOGY, AND ACCOUNTING PRACTICES: EVIDENCE FROM SMES IN MENA COUNTRIES

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Abstract

New technology innovations offer valuable opportunity for improve accounting practices. Therefore, this study examines on the relationship between Big Data Analytics, Blockchain technology and accounting practices in Middle East and North Africa (MENA) countries, with a particularly focus on Small –and Medium- Sized Enterprises (SMEs). This study adopted different measures to assess accounting practices, including performance management, financial reporting, firm budgeting, and fraud risk. Blockchain and Big data analytics were used as measures of financial technology. The study surveyed chartered and qualified accountants from 15 Middle East and North Africa (MENA) countries, collecting 1025 participants representing from SMEs. A Partial Least Squares Structural Equation Modeling (PLS-SEM) approach was used to test the hypotheses. The results show a positive and significant impact of Blockchain and Big data analytics on all measures of accounting practice measures in the sampled in SMEs across Middle East and North Africa countries. This study offered a theoretical foundation suggesting that accountants who adopt financial technology tools can gain deeper insight, better forecast outcomes, and streamline routine processes. this study examines the relationship between Big Data Analytics, Blockchain Technology and accounting practices in Middle East and North Africa countries, with a particular focus on Small –and Medium- Sized Enterprises (SMEs). Few studies were investigated this relationship over the world. The research provides insights into how these technologies affect financial reporting, performance management, company budgeting, and fraud risk management. The findings are useful for stakeholders especially accountants and highlights the importance of adopting big data analytics and blockchain technology to improve transparency, efficiency, and decision-making in accounting practices.

Keywords: Accounting practices, SMEs, Blockchain, Big data, Jordan, Fintech, Saudi Arabia, United Arab Emirates, Egypt, Mena.

JEL Classifications: M4; I23; O33.

1. INTRODUCTION

Recently, global interest increased in a new set of technology called Financial Technology (FinTech) due to their advantages achieved in high-quality data processing, (Bonsu et al., 2023). FinTech contains different dimensions i.e. Artificial Intelligence, Big Data evaluation (BIG), Blockchain (BCH), and cloud-based accounting. The primary goal of these technologies to achieve high-quality data and timely records processing.

FinTech has produced a paradigm shift in the financial sector by challenging traditional norms; its rapid advancement has affected many areas, including accounting (Thottoli, 2024 and Firas Al-Rawashdeh, Omar Al Singlawi, 2016, and Al-Smadi, A, et al., 2023). Small- and medium-sized enterprises (SMEs), which typically have limited resource, fewer staff and small capital budget, can particularly benefit from FinTech.

These technologies can help SMEs optimize service level by regulating and monitoring costs, mitigating production expenses, managing material procurement, as well as controlling inventory levels (Saad, 2023 and Li, et al., 2023).

The integration of innovative technological with traditional accounting in SMEs help accountants provide more accurate financial reporting and enhances internal control performance. this use of FinTech- complemented by big data analytics (BIG), blockchain (BCH) and cloud-based accounting- has proven instrumental in improving auditing procedures by providing auditors with stronger evidence and facilitating more reliable budgeting (Ibrahim et al., 2021).

Furthermore, Chen et al., (2016) elucidated how FinTech aligns with auditor's principles to raise closely with overall assurance levels by enabling the collection of more appropriate and sufficient audit evidence. Similarly, (Elamer et al., 2019) explain FinTech role in supporting more dependable budgeting and audit outcomes.

The Middle East and North Africa (MENA) region, with its dynamic economies and expanding financial sectors, has emerged as a focal point for understanding the impact of FinTech on traditional accounting practices. This shift is driven by factors such as increasing digitalization, a tech-savvy population, and supportive regulatory frameworks (Alkhalaf et al., 2023).

FinTech provided solutions for complex accounting tasks such as automated bookkeeping to BCH -based auditing and is reshaping how financial information is controlled, processed, and reported (Alsakarneh et al., 2023). e.g. Jordan, situated at the crossroads of the Mena regions, has emerged as a hub for technological innovation, including within the financial sector. its FinTech landscape features a growing ecosystem of startups and established firms leveraging technology to enhance financial services (Alaa, 2023, Mohammad et al., 2022 and Al-Smadi, A and Al-Smadi, R. 2021), recently seen a marked surge in FinTech adoption (Ministry of Digital Economy and Entrepreneurship of Jordan ,2023).

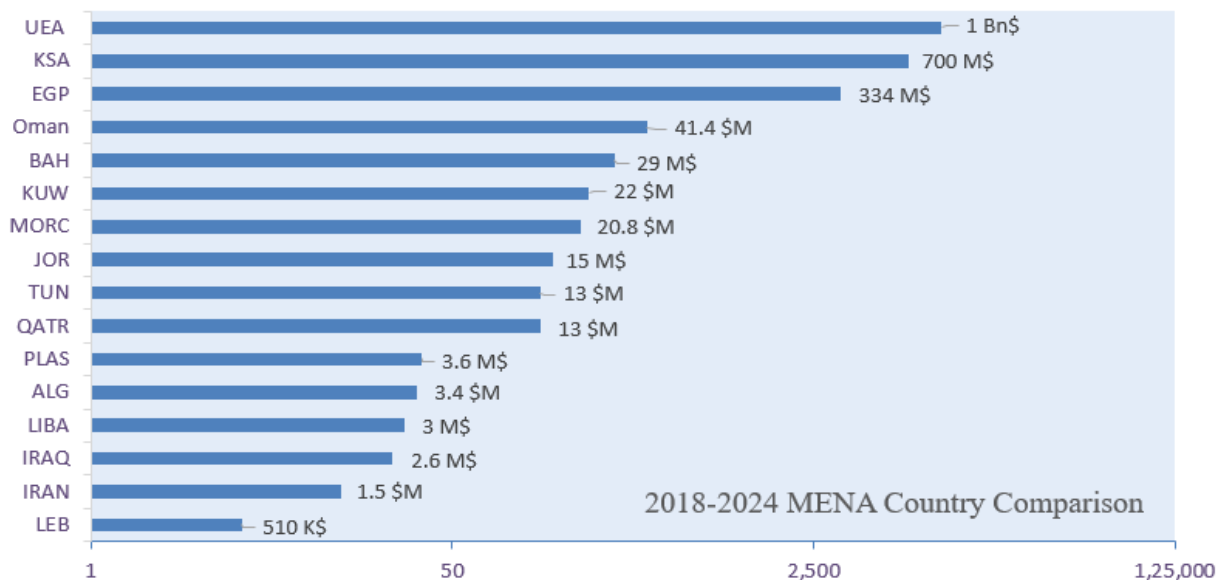


Figure 1: Total Funding of Fin-Tech in top countries

Note: Bahrain (BHA), Qatar (QAR), Jordan (JOR), Egypt (EGP), United Arab Emirates (UAE), Saudi Arabia (KSA), Qatar (QATR), Tunisia (TUN), Iran (IRAN), Libya (LIBA), Iraq (IRAQ), Palestine (PLAS) Lebanon (LEP), Kuwait (KUW), Oman (OMAN) and Algeria (ALG). Source: Jordan Venture Investment Report 2018-2024, Magnitt, the Ministry of Digital Economy and Entrepreneurship of Jordan, (2025)

Eventuality this research lies in its specific exam of the effect of big data analytics and BCH technology, on accounting practices in Mena region, providing clear insights and implications for accountants, managers, and regulators within the region. The next section of this study will be Section 2 present reviewing existing literature, hypotheses. Following by Section 3 provides details of the methods, sample and techniques that used in this study. Section 4 delves into findings and effects. section 5 presents the conclusions and summarizes section 6 coverage Limitations and Future Research

2. EMPIRICAL LITERATURE, THEORETICAL GROUNDING, AND HYPOTHESES

2.1 Empirical literature

FinTech—here operationalized as Big Data Analytics (BID) and Blockchain (BCH)—is reshaping accounting by improving data availability, processing speed, and record integrity. BID enhances analytical capacity (large-scale pattern detection, predictive forecasting, continuous monitoring) while BCH delivers tamper-resistant records and programmable transactions (e.g., smart contracts). Together, these technologies change core accounting tasks—financial reporting, performance management, budgeting, and fraud risk control—by altering the volume, veracity, and timeliness of information available to accountants and auditors (Chen et al., 2016; Vasarhelyi & Alles, 2018; Alkafaji et al., 2023). Evidence across contexts shows generally positive effects of FinTech on

accounting functions but with important contingencies. Empirical studies in Africa and China report improved reporting and managerial outcomes from BID adoption (Bonsu et al., 2023; Chen et al., 2023), while sector-focused work finds BCH can strengthen internal controls and managerial performance in banking (Kharrat et al., 2024). These findings suggest two consistent mechanisms: (1) BID improves completeness, anomaly detection, and forecasting accuracy (supporting faster and more informative reporting and budgeting); (2) BCH strengthens provenance and auditability, reducing opportunities for tampering and improving traceability (supporting fraud prevention and evidence quality).

Context matters. Organizational readiness (IT capacity, analytics skills, ERP integration), institutional pressures (regulation, professional norms), and digital infrastructure moderate technology impacts. Smaller firms may show larger proportional gains from analytics but face resource and skills constraints; regulatory regimes that encourage transparency increase the returns to BCH's audit-trace features (Bonsu et al., 2023; Kock, 2015; Scapens et al.). For MENA SMEs—our focal population—fragmented regulations, varying internet penetration, and heterogeneous ERP uptake motivate an empirical focus here: results from large listed firms or different regions may not generalize to SMEs in MENA.

Literature by accounting sub-function

2.2.1 Financial reporting (FIR)

BID enables continuous auditing, automated reconciliations, and anomaly detection that improve timeliness and analytical depth of reports; BCH augments integrity and on-chain verification for transaction-level evidence (Vasarhelyi & Alles, 2018; Alkafaji et al., 2023). Prior empirical work finds BID and BCH are associated with higher reporting quality, though observed effect sizes vary with firm size and data availability (Chen et al., 2016; Bonsu et al., 2023).

2.2.2 Performance management (PMA)

BID supports real-time KPI monitoring and predictive indicators that improve decision responsiveness; BCH reduces information asymmetry across units via secure shared ledgers, facilitating more accurate performance measurement (Wang et al., 2023; Mitra & Karathanasopoulos, 2020). Evidence is mostly positive but often comes from specific implementations or larger firms.

2.2.3 Firm budgeting (FBU)

Predictive analytics increase forecasting accuracy and enable adaptive budgeting, while BCH can strengthen verification of budgeted transactions and receipts (Chao & Tao, 2023; Cruz-García et al., 2021). Empirical work remains limited, especially for SMEs, but suggests BID drives forecast improvements and more frequent budget revisions, whereas BCH's direct effect on forecasting is weaker.

2.2.4 Risk and fraud management (RFMA)

BID's pattern-recognition and anomaly-scoring algorithms enhance detection sensitivity; BCH's immutability reduces opportunities for data tampering and supports provenance-based prevention (Feyen et al., 2021; Mhlang, 2020). Together they address detection and prevention channels, though effectiveness depends on data quality and integration into control systems.

Table (1): summary of previous studies

Study (author, year)	Technology focus	Main finding(s)	Method / sample	Key limitation(s) / gap
Almashhadani & Almashhadani (2022)	FinTech / RPA	FinTech automation reduces manual effort, errors, and speeds up financial report generation	Descriptive/empirical (survey or case; reported as broad finding)	Lacks causal identification; unclear sample scope; does not examine moderators (e.g., staff data-literacy)
Alkafaji et al. (2023)	Blockchain (BCH)	BCH provides secure, transparent, tamper-resistant ledgers, enhancing integrity of financial data	Conceptual / early empirical evidence	Treated blockchain as unitary; insufficient disaggregation of features (immutability vs smart contracts) and institutional contingencies
Bonsu et al. (2023)	Big Data (BID) as measure of FinTech	BID positively impacts accounting practices (financial reporting, PM, budgeting, auditing, risk/fraud management) in African contexts	Cross-country survey / empirical (African firms)	Potential selection bias; limited exploration of moderators (institutional strength, IT infrastructure); measurement focused on BID only
Kharrat, Trichilli & Abbas (2024)	Blockchain (BCH)	BCH improves management performance, profitability, stability, and efficiency in conventional and Islamic banks in MENA	Text-mining + simultaneous-equation model on bank data	Limited to banking sector; mechanism linking on-chain features to managerial controls not fully specified; generalizability beyond MENA unclear
Wang et al. (2023)	FinTech (algorithms, ML) for performance management	FinTech automates monitoring and KPI assessment, reducing manual work and improving service outcomes	Empirical study of FinTech implementations (details vary)	Often based on specific implementations; limited attention to moderators (e.g., workforce skills)

				and long-term effects
Chen et al. (2023)	FinTech / BID	FinTech adoption is positively associated with corporate performance management among listed Chinese firms (2011–2018)	Large sample provincial panel of listed firms; longitudinal	Focused on listed firms in China — limited external validity; potential omitted variable bias despite panel design
Uña et al. (2023)	FinTech tools for budgeting	FinTech automates budget generation and tracking, reduces manual effort, and improves resource allocation	Empirical/illustrative implementations (details vary)	Often descriptive about tools; limited causal evidence and few cross-industry tests
Chao & Tao (2023)	Predictive analytics in FinTech	Predictive analytics use historical data and market trends to improve forecasting accuracy and budget projections	Empirical / case studies or firm-level analyses	Need for larger samples and tests of when predictive accuracy translates into better budgeting decisions

2.3 Theoretical frameworks

We ground hypotheses in the Technology–Organization–Environment (TOE) framework and Institutional theory. TOE highlights how technological attributes (relative advantage, compatibility), organizational readiness (skills, IT infrastructure), and environmental pressures (regulation, market norms) jointly shape adoption outcomes (Tornatzky & Fleischer, 1990). Institutional theory explains how coercive, normative, and mimetic pressures (e.g., regulatory transparency mandates, professional norms) affect the uptake and operational impact of BCH and BID. Integrating these perspectives clarifies why identical technologies produce different accounting outcomes across firms and countries.

2.4 Summary and hypotheses

The literature implies that BID will most strongly affect outcomes tied to analytics and timeliness (FIR, PMA, FBU), while BCH’s strongest effects will be on integrity-dependent outcomes (RFMA, and auditability within FIR). Based on this synthesis we test:

H1a. BID positively affects Accounting Financial Reporting (FIR) in MENA SMEs.

H1b. BCH positively affects Accounting Financial Reporting (FIR) in MENA SMEs.

H2a. BID positively affects Performance Management (PMA) in MENA SMEs.

H2b. BCH positively affects Performance Management (PMA) in MENA SMEs.

H3a. BID positively affects Firm Budgets (FBU) in MENA SMEs.

H3b. BCH positively affects Firm Budgets (FBU) in MENA SMEs.

H4a. BID positively affects Risk Fraud Management (RFMA) in MENA SMEs.
 H4b. BCH positively affects Risk Fraud Management (RFMA) in MENA SMEs.

3. RESEARCH METHODOLOGY

3.1 Research design and population

This study uses a cross-sectional survey to test hypotheses about the effects of Big Data Analytics (BID) and Blockchain (BCH) on accounting practices in SMEs across 15 MENA countries. Target respondents were accountants and finance professionals working in SMEs. Data were collected during 2023–2024 via an emailed online questionnaire. Participation was voluntary, anonymous, and preceded by informed consent; the study obtained institutional ethical clearance.

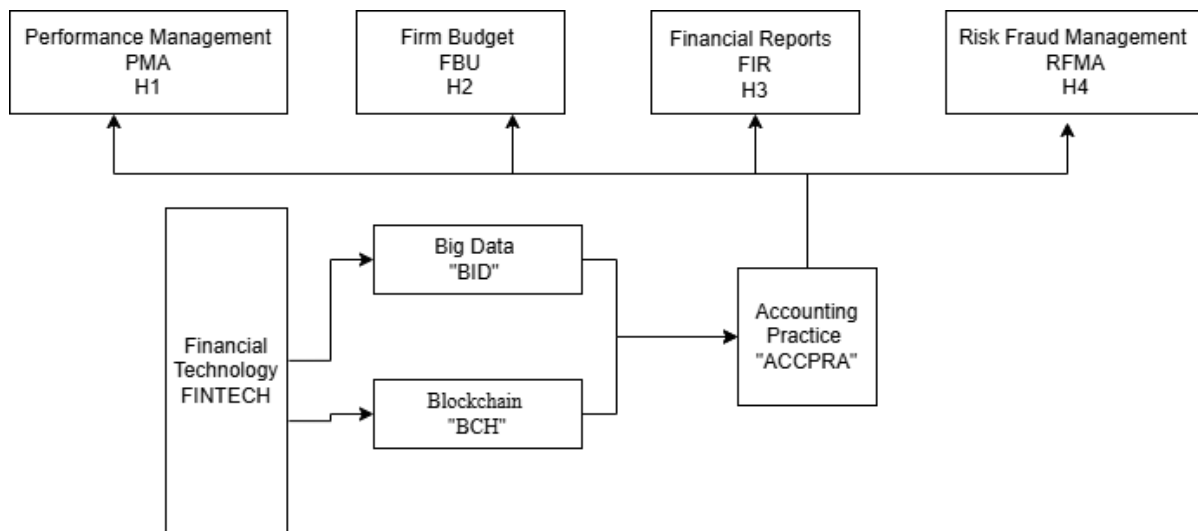


Figure (2): Framework of the study

3.2 Sampling and sample size

We used purposive convenience sampling, drawing contact information from professional registries, SME directories, accountancy associations, chambers of commerce, and corporate websites/LinkedIn lists.

Invitations were sent to approximately 1,300 professionals; after cleaning for incomplete responses, implausible completion times, and straight-lining, the final sample comprised $n = 1,025$ usable responses (275 excluded). Table 1 presents condensed respondent demographics (age, gender, experience, industry). Where possible we stratified outreach by country and firm size to improve coverage.

3.3 Measures and instrument development

All constructs were measured on a 7-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). BID and BCH scales were adapted from prior studies; outcome constructs are: Financial Reporting (FIR), Performance Management (PMA), Firm

Budgeting (FBU), and Risk & Fraud Management (RFMA). Item sources and the final item set (34 items) are listed in Appendix A.

We followed a two-step validation process. An expert panel (6 academics/practitioners) assessed content validity; items with low relevance were revised or removed. A pilot (n = 60 across Jordan, UAE, Egypt) tested clarity and completion time; cognitive interviews (n = 12) informed further wording changes. Two items with low loadings (loading < 0.50) were removed after the pilot.

3.4 Data analysis approach

We employ Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS to estimate measurement and structural models. PLS-SEM is appropriate given the model complexity and our goal of prediction/explanation with latent constructs. Analyses followed standard procedures: assess measurement model (reliability, convergent and discriminant validity), then estimate structural paths and report effect sizes and out-of-sample predictive checks.

3.5 Measurement model tests

Reliability was assessed via Cronbach's alpha and Composite Reliability (CR). Convergent validity was evaluated using Average Variance Extracted (AVE) and item loadings. Discriminant validity was tested using the Fornell–Larcker criterion (reporting summarized results in Table 3; full matrix in Appendix B). Table 3 reports factor loadings, Cronbach's alpha, CR and AVE for each construct.

3.6 Common method and multicollinearity checks

To guard against common-method bias we applied Harman's single-factor test and the full-collinearity VIF approach in PLS (Kock, 2015). Harman's test did not indicate a dominant single factor; full-collinearity VIFs for constructs were < 3.3. Construct-level VIFs are reported in Table 4 (Variance Inflation Factor (VIF) results). The detailed item-level VIF table is in Appendix B.

3.7 Structural model assessment and robustness checks

We assessed path significance using bootstrap resampling (5,000 resamples) and report path coefficients, t-values, and 95% bootstrap confidence intervals in the main results table (Table 7). Effect sizes are reported using Cohen's f^2 . Predictive relevance was evaluated via SRMR and PLS predict with 10-fold cross-validation; out-of-sample predictive statistics are summarized in this section. Robustness checks included re-estimating models excluding outliers, alternative control sets (theory-justified), and alternative item selections; main results remain qualitatively consistent.

3.8 Control variables and theoretical mapping

We control for respondent age, gender, education, and professional experience because these factors can influence familiarity with technology and perceptions of impact. The constructs map to TOE and Institutional theory: BID and BCH represent Technology; organizational readiness (IT capability, ERP presence, staff experience) represents

Organization; and perceived regulatory/professional pressures represent Environment. Interaction terms with organizational readiness and country-level regulatory strength were estimated where theoretically justified.

3.9 Transparency and reproducibility

To support replication we include the final survey instrument (Appendix A), full item loadings and item-level VIFs (Appendix B), supplementary robustness tables (Appendices C–D), and country-level heterogeneity estimates (Supplementary Materials).

4. RESULT AND DISCUSSIONS OF THE STUDY

4.1 Result of the Study

This study used the smart PLS model to test and verify the hypotheses, according to (Fornell and Larcker, 1981) The Structural Equation Modeling (SEM) framework stands out as the most suitable model for scrutinizing actual data. Consequently, in the present study, the initial examination will involve assessing the discriminant and convergent validity of all items within the constructs to affirm their unidirectional reliability. then utilize regression models to investigate the effect of Fin-tech (BCH and BID) on practices of accounting. The study was primarily confirmatory — it tested pre-specified hypotheses grounded in the Technology Organization Environment (TOE) framework and Institutional theory. We included control variables (age, gender, education, and professional experience) because they capture individual-level differences in digital literacy, familiarity with accounting technologies, and professional judgment that could influence survey responses and perceived impacts of BID and BCH. Specifically, age proxies digital literacy, gender captures documented adoption differences and role distributions in accounting teams, education represents formal training in data/technology skills, and professional experience captures exposure to organizational systems and potential conservatism toward new technologies. To reduce overfitting risk, we checked multicollinearity (full-collinearity VIFs < 3.3), conducted Harman’s single-factor test to screen for common-method variance, reported effect sizes (Cohen’s f^2) to assess practical significance, compared nested models for parsimony, and re-estimated main models excluding non-essential controls as a robustness check.

Next, the study hypothesis within the SEM model because of the characteristics of the collected Statistics and distributed through countries, the current study obtained a final sample of 1025 responses from SMEs, while 275 responses were excluded from the analysis because of incomplete.

Table (2): SMEs Responded Sample

Items	Categorizes	Responded no	Responded rate
Age	25-29	103	10%
	30-47	615	60%
	48- above	307	30%
Gender	Male	718	70%

	Female	307	30%
Education level	College	256	25%
	Bachelors	615	60%
	Postgraduate	154	15%
Experience	1-5	77	7.5%
	7-17	589	57.5%
	18-25	205	20%
	26-above	154	16.5%
Industry	Manufacturing	103	10%
	Finance and insurance	717	70%
	Service	205	20%

Table (3): Validity and Reliability

Variables	No items	Mean factor loading (FLO)	Cronbach's alpha (CA)	Composite Reliability (CR)	AVE
Big Data (BID)	9	0.77	0.88	0.919	0.551
Blockchain (BCH)	8	0.74	0.80	0.901	0.527
Financial Reports (FIR)	4	0.85	0.81	0.881	0.552
Performance Management (PMA)	5	0.76	0.77	0.905	0.553
Firm Budget (FBU)	3	0.83	0.47	0.990	0.711
Risk & Fraud Management (RFMA)	5	0.79	0.80	0.887	0.571

All constructs show acceptable reliability and convergent validity — Cronbach’s alpha and Composite Reliability (CR) exceed 0.70 and AVE exceeds 0.50 (Table 3). Discriminant validity was examined via the Fornell–Larcker criterion (Table 5). Multicollinearity was assessed using full-collinearity VIFs and all values were below 3.3 (Table 4). Harman’s single-factor test did not indicate a dominant single factor, suggesting common-method variance is unlikely to drive the results. Structural relationships were tested using bootstrapping (N = 5,000 resamples); path coefficients, t-values, and 95% bootstrap confidence intervals are reported in Tables 6–7. We also computed Cohen’s f^2 for each predictor to assess effect magnitude and blindfolding Q^2 to evaluate predictive relevance ($Q^2 > 0$ indicates predictive relevance). Sensitivity checks re-estimating models without non-essential controls produced qualitatively similar results Fornell and Larcker (1981).

Table (4): Variance Inflation Factor (VIF) results

Variable	VIF
BID (Big Data Analytics)	2.12
BCH (Blockchain Technology)	2.05
Organization Readiness	1.98
Environment Pressure	2.20
FIR (Financial Reports)	1.75

PMA (Performance Management)	1.89
FBU (Firms Budgeting)	1.83
RFMA (Risk & Fraud Management)	2.01
(BID1)	1.62
(BID2)	1.70
(BID3)	1.55
(BID4)	1.68
(BID5)	1.61
(BCH1)	1.80
(BCH2)	1.77
(BCH3)	1.69
(BCH4)	1.74
(FIR1)	1.40
(FIR2)	1.45
(PMA1)	1.57
(FBU1)	1.49
(RFMA1)	1.60
(RFMA2)	1.58

All the variables that presented in Table (4) show no serious multicollinearity concerns which is below then 3.3. Kock, (2015) explained that the values below 3.3 indicate no multicollinearity, we applied Harman’s single-factor test and the full collinearity VIF approach in PLS (Kock, 2015). Harman’s test did not extract a single factor explaining >50% variance; full collinearity VIFs for construct scores were < 3.3, indicating CMV is unlikely to bias results.

Table (5) illustrates a noteworthy impact of BID on accounting practices at an importance stage of 1%, similarly, there is compelling proof assisting the large and enormous impact of BCH on accounting practices, also at a 1% significance degree. These findings verify and validate the notion that massive data and blockchain have the potential to enhance accounting practices. Subsequently, the current study calculates accounting exercise by R2 model, revealing a significant variability in the construct (with R2 of BID = 0.553 and R2 of BCH = 0.665), aligning with the standards installed with the aid of Chin (1998). Consequently, the empirical validity of the model is deemed enough.

Table (5): Discriminant Validity (Fornell -Lacker diagonal = sqrt (AVE))

Main variables	BID	BCH	FIR	PMA	FBU	RFMA
BID	0.732	0.422	0.618	0.498	0.552	0.521
BCH	0.422	0.718	0.594	0.466	0.553	0.444
FIR	0.618	0.594	0.743	0.661	0.555	0.561
PMA	0.499	0.466	0.662	0.743	0.655	0.667
FBU	0.555	0.552	0.551	0.655	0.771	0.666
RFMA	0.512	0.432	0.571	0.667	0.666	0.771

Interpretation of effect sizes and theoretical integration: While BID and BCH show statistically significant positive effects across all examined accounting functions, the magnitudes and practical implications vary. For example, BID’s path to Performance Management ($\beta = 0.611$) and Risk & Fraud Management ($\beta = 0.599$) indicate large effects

suggesting BID meaningfully improves accountants' analytical capabilities and anomaly detection. BCH shows particularly strong effects on RFMA ($\beta = 0.775$), consistent with blockchain's tamper-resistant ledger improving transaction integrity and auditing traceability. These findings align with TOE: technology benefits materialize when organizational readiness (skills, IT infrastructure) and environmental supports (regulatory clarity, interoperability) are present. Institutional pressures (regulatory and professional norms) plausibly amplify BCH impacts where regulators emphasize record transparency.

the results suggest prioritizing investments in data analytics capability (training, infrastructure) to realize gains in reporting, budgeting, and fraud detection. Where regulatory frameworks support shared ledgers or impose stricter audit trails, blockchain pilots may deliver larger risk-management benefits. Managers should focus first on organizational readiness (analytics skills, data governance) to maximize returns from BID and BCH initiatives.

The positive impact implies that BID enhances management performance by approximately 0.611%, which is confirmed by the findings of (Chen et al., 2016) who explored that BID contributes to achieving a competitive advantage for firms. Consequently, confirmed that BID reduces the costs associated with unstructured data and empowers managers to formulate more visionary strategies for future scenarios. In the field of corporate budgeting, BID exhibits a statistically significant impact on firm's budgets in (1%) significance level, BID improve firm's budgeting by around (0.507%) degree (see table, 6). This underscores that the utilization of BID by accountants improves the processes of budgeting and forecasting. This result is confirmed by the existing body of literature on BID and accounting e.g. (Sardi et al., 2020).

Table (6): Regression of Fintech, Accounting Practice and Control Factors in SMEs

Corporate Accounting practices in SMEs					
Main variables	Coefficient estimation	R2 Adjust	R2 change	F change	Observation No
BID	0.663***(13.771)	0.553	0.433	160.11	1025
BCH	0.771***(22.330)	0.665	0.655	512.22	1025
Gender	0.200***(2.212)	0.330	0.217	70.995	1025
Experience	0.772***(17.885)	0.612	0.779	333.581	1025
Educations	0.765***(16.821)	0.661	0.223	224.888	1025
Age	0.118***(2.401)	0.022	0.111	60.221	1025

Moreover, statistically, the results reveal widespread effects of BCH on corporate budgeting at a 1% significance degree (see table 7 and table 5). This shows that the integration of BCH can enhance company budgeting and forecasting by 0.551%, declaring the idea that BCH aids accountants in automating cease-to-give-up economic methods and improving efficiency in addressing strategic troubles for the firm (Collier and Berry, 2002). This result aligns with (fraud 2015 and Vasarhelyi, Alles, 2018) findings that BCH decreases fraud opportunities, improves accounting practices, and contributes to the transition from classical auditing practices. Similarly, Chukwuani and Egiji (2020)

explored that BCH despite lacking numerous portions of proof, affords facts that are sufficient, applicable, and reliable according to auditing requirements. Finally, there are massive effects of BCH on hazard and fraud control at a 1% significance degree, indicating that BCH may want to enhance the risk and fraud control practices of accountants by way of approximately 0.775%. Thus, our findings verify the competency of artificial intelligence in enhancing accounting practices

Table (7): The impact between Fintech and accountants practice in SMEs

Dependent	BID	BCH	R2	Adjust R2
FIR	0.588 ***(8.55)	0.551 ***(9.55)	0.346	0.320
PMA	0.611 ***(11.81)	0.659 *** (16.45)	0.242	0.213
FBU	0.507 ***(11.99)	0.544 *** (9.42)	0.488	0.467
RFMA	0.599 *** (13.08)	0.775 *** (18.82)	0.466	0.439
Gander	0.121 (1.187)	-0.016 (-0.415)	0.053 (1.248)	-0.004 (-0.066)
Experience	0.088 (1.521)	0.066 (2.134)	0.135* (3.0007)	0.212 *** (4.724)
Educations	0.669 *** (8.321)	0.888 *** (15.084)	0.506 *** (10.935)	0.801 *** (11.714)
Age	-0.0171 (1.896)	0.617 *** (17.074)	0.106 *** (8.834)	-0.044 (0.444)
Observation No	1025	1025	1025	1025

In Table (7) the R2 Adjusted for monetary reporting, performance management, company budgeting, and risk and fraud management tested and demonstrated a degree of explanatory power (R2 for FIR = 0.346, R2 for PMA= 0.242, R2 for FBU = 0.488, and R2 for RMFA = 0.466). These findings align with the standards that were established by Chin (1998). The outcomes from this study offer aid for hypotheses H1–H4 (refer to Table, 8) the result existing in this study are constant with different scholars and accounting professionals (Chukwuani & Egiji, 2020; Asatiani et al., 2019 and Jain, 2018). Furthermore, Collier & Berry (2002) confirmed the ability of BCH to help accountants automate monetary operations, thereby improving organizational strategies. The argument presented suggests that the usage of BCH through accountants improves efficiency in critical routines and practices, in the long run leading to knowledgeable selection-making. Notably, the shortage of empirical studies on the impact of BCH on accounting practices brought on our efforts to cope with this hole via empirically approximating the results of BCH on accounting practice. Particularly, the combination of financial technology dimensions such as (BID–BCH) contributes to enhanced accounting practices experts among chosen countries in the Mena region.

Table (8): Hypothesis Validity

Main Hypothesis	Impact	Estimations	Confirmations
H1	Fintech- FIR	0.515 (11.153) ***	valid
H2	Fintech- PMA	0.920 (16.081) ***	valid
H3	Fintech- FBU	0.664 (10.990) ***	valid
H4	Fintech- RFMA	0.544 (14.668) ***	valid

In conclusion, we tested the effect of different control factors, inclusive (age, experience, education, gender and training) on accosting practice include (financial reporting, (FIR), performance management, (PMA), corporate budgeting, (FBU), and risk and fraud management, (RFMA)). The results revealed that the first control variables which is Age

well-known shows a positive yet statistically insignificant effect on RFMA (0.617 and 0.106). Conversely, age has proven a negative and statistically insignificant association with on financial reporting, corporate budgeting (-0.0171 and -0.044). As well as, the second control variables which is Gender has been observed in this study to have a positive effect on financial reporting and company budgeting, risk, and fraud management. Notably, there are negative effect of gender on risk and fraud management and Performance Management. Intriguingly, the third control variables which is education exhibited a positive and statistically significant correlation with advanced financial reporting, performance management, company budgeting, and risk and fraud management on the 1% importance stage the results showed 0.669, 0.888, 0.506 and 0.801 consecutively.

This implies that a 1% increase in an accountant's education ought to decorate their accounting practices. Finally, the fourth control variables which is accountant experience displayed a positive impact but no significant consequences on all accounting practices except for company budgeting 0.135 and risk and fraud management 0.212 (see Table 5). The diversity of accounting practices inside the sectors is affected by various factors including country of operation, age, experience, and industry association. This prompts an exploration into whether or not the effect of fin-tech (BID and BCH) on (financial reporting, (FIR), performance management, (PMA), corporate budgeting, (FBU), and risk and fraud management, (RFMA)) varies primarily based on the traits of accountants inside these different countries. Moreover, many of previous study explained that these control variables effects accountants technology adoption, analytic capacity, and judgement (Salin et al., 2024). Education refer to formal training in data/tech skills; experience proxies for practical exposure and potential resistance to new tools; age showed the effects in digital literacy; and gender captures documented differences in technology adoption and organizational role.

Table (9): Result of the Heterogeneity Test

Countries name Main Variables	JOR ACCPRA	KSA ACCPRA	UAE ACCPRA	EGP ACCPRA	BHA ACCPRA
BID	0.936*** (0.477)	0.042 (0.171)	0.827 ** (0.269)	0.018 (0.072)	0.525 (0.066)
BCH	0.922*** (12.597)	0.751*** (10.216)	0.770*** (9.997)	0.999*** (12.116)	0.540 (0.787)
Control variables					
Gander	0.003 (0.027)	0.020 (0.459)	0.005 (0.027)	0.021 (0.517)	0.001 (0.038)
Experience	0.004 (0.048)	0.018 (0.358)	0.003 (0.014)	0.022 (0.529)	0.001 (0.044)
Educations	0.030 (0.520)	0.049 (0.520)	0.023 (0.958)	0.046 (0.530)	0.032 (0.778)
Age	0.044 (0.640)	0.058 (0.430)	0.043 (0.799)	0.038 (0.230)	0.023 (0.490)
R2 Adjusted	0.584	0.8	0.784	0.9	0.581
R2 change	0.803	0.81	0.661	0.91	0.463
Countries name Main Variables	QATR ACCPRA	TUN ACCPRA	IRAN ACCPRA	LIBA ACCPRA	IRAQ ACCPRA
BID	0.886*** (0.547)	0.444** (0.241)	0.047 (0.071)	0.017 (0.041)	0.046 (0.017)

BCH	0.021 (0.597)	0.831*** (12.406)	0.072 (0.098)	0.791*** (15.516)	0.621*** (17.587)
Control variables					
Gander	0.215** (0.224)	0.420 ** (0.551)	0.508** (0.47)	0.856*** (0.719)	0.893*** (0.857)
Experience	0.407*** (0.778)	0.218 * (0.228)	0.113 ** (0.258)	0.122* (0.719)	0.404** (0.740)
Educations	0.090 (0.310)	0.055 (0.250)	0.023 (0.958)	0.065 (0.350)	0.055 (0.880)
Age	0.024 (0.720)	0.078 (0.340)	0.073 (0.599)	0.038 (0.220)	0.065 (0.460)
R2 Adjusted	0.774	0.890	0.884	0.742	0.665
R2 change	0.923	0.55	0.771	0.85	0.759
Countries name Main Variables	(PLAS) ACCPRA	(LEP) ACCPRA	(KUW) ACCPRA	(OMAN) ACCPRA	(ALG) ACCPRA
BID	.837 ** (0.817)	0.792 ** (0.871)	.552 ** (0.335)	0.017 (0.028)	0.717 *** (0.772)
BCH	0.077 (0.054)	0.951*** (16.316)	.550*** (15.990)	0.112*** (13.106)	0.881*** (14.226)
Control variables					
Gander	0.020 (0.015)	0.017 (0.887)	0.011 (0.025)	0.019 (0.715)	0.020 (0.552)
Experience	0.023 (0.078)	0.014 (0.225)	0.007 (0.016)	0.028 (0.925)	0.085 (0.258)
Educations	0.040 (0.812)	0.055 (0.250)	0.058 (0.859)	0.064 (0.350)	0.055 (0.035)
Age	0.072 (0.550)	0.0889 (0.669)	0.022 (0.721)	0.083 (0.330)	0.022 (0.288)
R2 Adjusted	0.220	0.258	0.889	0.448	0.880
R2 change	0.221	0.180	0.552	0.025	0.532

Table 9 lists path coefficients by country, first check whether differences across countries are statistically significant. secondly Identify the consistent patterns (BID → FIR, BCH → RFMA, etc.) across countries? Which paths vary widely? thirdly, explains whether technology effects (BID/BCH) are stronger in certain countries or clusters (e.g., GCC vs non-GCC, high vs low internet penetration, higher ERP adoption, greater numbers of listed firms, or stronger digital skills — these factors strengthen the data/analytics channel. fourthly, consider in sample composition, are some country samples small or sector-skewed? Smaller n by country increases estimation noise.

the estimated effects of BID and BCH on accounting outcomes vary across MENA countries. Specifically, table (9) shows that there is a significant effect in JOR and UAE among BID and BCH on the ACCPRA is sizable at the 1% degree. The findings advise that the usage of both BID and BCH by both countries can decorate their ACCPRA, encompassing FIR, PMA, FBU, and RFMA. In a similar vein, BID demonstrates an insignificant association with ACCPRA in the KSA and EGP and the result showed no significant link between both variables BID and BCH and ACCPRA in BHA. Conversely, the utilization of BCH exhibits a massive positive impact on ACCPRA at the 1% significance level for KSA and EGP. Also above table show there is a significant effect in QATR and TUN between BID on ACCPRA sizable at the 1% degree. In additions, the above table show that each of TUN, LIBA and IRAQ have positive relationship between BCH and ACCPRA in 3%, moreover the result explored insignificant relationship between BID and ACCPRA in each of IRAN, LIBA and IRAQ, also there is no significant link between BCH and ACCPRA in QATR and IRAN usage of both BID and BCH by countries can decorate their ACCPRA, encompassing FIR, PMA, FBU, and RFMA.

Furthermore, table (9) conclude that there is a significant link in LEP, KUW and ALG among BID and BCH on the ACCPRA is sizable at the 3% degree, while the result found insignificant relationship between BCH and ACCPRA in PLS and significant between BCH and ACCPRA, lastly the result found insignificant relationship between BID and ACCPRA in OMAN and significant relationship between BCH and ACCPRA. Interpreting these heterogeneities through the TOE and institutional lenses helps explain these patterns. Under TOE, technology effects (BID, BCH) translate into accounting outcomes only when organizational readiness (IT capability, analytics skills) and environmental supports (infrastructure, interoperable systems) exist. Thus countries where BID effects are larger likely combine higher digital infrastructure and greater internal readiness, enabling analytics to improve reporting and budgeting. Institutional theory suggests that coercive pressures (regulatory enforcement) and normative pressures (professional and industry practices) shape BCH adoption and impact: where regulators encourage transparent, tamper-resistant transactions, BCH more readily reduces fraud risk. Accordingly, differences in internet penetration, ERP/ERP-like adoption, and regulatory emphasis across MENA countries plausibly account for the observed patterns.

Finally, these cross-country interpretations should be read with caution. First, sample sizes differ by country, and smaller country subsamples reduce statistical power and increase estimation noise; where subsamples were small we treat coefficient differences as suggestive rather than definitive. Second, the analysis uses self-reported measures and may reflect perceptual biases; although we performed Harman's single-factor test and full-collinearity VIF checks (see Methodology section), common-method variance cannot be entirely ruled out. Third, unobserved country-level factors (e.g., sectoral composition, recent policy changes, or pilot technology initiatives) may confound the observed heterogeneity. As robustness checks we (i) re-estimated the main models after excluding outliers, (ii) estimated more parsimonious models excluding non-essential control variables, and (iii) checked the sensitivity of results to alternative item selections.

4.2 Discussions

Conceptually, the findings in this study contribute to the literature on FinTech and accounting practices. our empirical results declare that Fintech - specifically the combined of BID and BCH - positively influences in the FIR, PMA, FBU, and RFMA in Small and Medium - sized Enterprises (SMEs).

Results align with TOE expectations — technology advantages (BID, BCH) translate into accounting improvements when organizational readiness and environmental supports exist. BID enhances analytics capability (timeliness, anomaly detection), improving PMA and RFMA. BCH strengthens data integrity and traceability, explaining its particularly large effect on RFMA. Institutional theory: BCH effects are stronger in countries or contexts with coercive regulatory pressures that reward transparent, tamper-evident records. The observed cross-country heterogeneity (Appendix D) likely reflects differences in regulatory emphasis, digital infrastructure, and firm readiness. we present a unified theoretical framework and empirical evidence that explain these relationships in the context of accounting practice across 15 Mena countries. To our knowledge, this

study is the first to bridge the gap between Technology Organization Environment and Institutional theories and the application of BID and BCH in the field of accounting in Mena countries.

These findings extend Bonsu et al. (2023) and Chen et al. (2023) by showing similar benefits in MENA SMEs rather than larger listed firms or other regions. The particularly large BCH → RFMA effect echoes prior conceptual claims about blockchain's integrity benefits (Alkafaji et al., 2023) and empirical indications (Kharrat et al., 2024).

5. CONCLUSIONS AND POLICY IMPLICATIONS

The current study has many contributions one of the most important contributions is producing exciting vision into the empirical effects by employing BCH and BID on accounting practices, showcasing the transformative effect of these technologies on the countries. Consequently, the current study asserts that accountants have to actively adopt new technologies such as BCH and BID into their practices to elevate the performance and durability of their firms, our findings suggest that accountants utilizing BID and BCH contribute to companies gaining deeper insights, looking ahead to outcomes, and streamlining non-recurring processes.

For practitioners: Prioritize investments in BID capability (data governance, analytics skills) to quickly realize gains in performance monitoring and fraud detection. Pilot BCH applications where audit trails and provenance are critical (e.g., supply-chain invoicing, payment reconciliation). should pilot automated bookkeeping and optical character recognition (OCR) tools to reduce manual entry errors and free staff for advisory work; firms engaged in audit and risk work should invest in basic data analytics platforms (e.g., spreadsheet automation plus low-code analytics) to improve anomaly detection before committing to enterprise-grade solutions; and organizations seeking better internal control should adopt cloud-based workflow and reconciliation modules with role-based access to strengthen traceability

Moreover, this study gives a clear sight for the Policymakers, consider targeted subsidies, sandboxing, and interoperability guidance to lower adoption barriers for SMEs and amplify the public-good benefits of transparent ledgers (reduced fraud, improved tax reporting).

6. LIMITATIONS AND FUTURE RESEARCH

The study faced many of limitations which the future study must to avoided it to get better result, Cross-sectional survey and perceptual measures limit causal claims — longitudinal and behavioral data would strengthen inference. Country subsamples vary in size; country-specific estimates with small n should be treated as suggestive. Future research should combine objective performance indicators (e.g., audit adjustments, budget variances) and larger country-level samples. Broader FinTech dimensions (AI, payments, RegTech) could be examined to map which technologies deliver which accounting gains and under what organizational conditions.

The current study suggests the future research investigate the negative effects of financial technology and their impact on the company's profit. As well as, Future traits in FinTech and risk control may additionally involve accelerated collaboration with regulatory technology (RegTech). Combining FinTech and RegTech can decorate compliance, reduce regulatory risks, and streamline reporting techniques. There can be biases in the sample choice, data collection, or analysis that might affect the study result. It is necessary to deal with any potential biases that face the research to make sure the validity and reliability of the findings. Addressing these limitations and biases in future research can make contributions to an extra comprehensive know-how of the effect of FinTech on accounting practices.

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