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The Impact of Digital Accounting System Adoption on Financial Reporting Quality: The Mediating Role of Internal Control Effectiveness in Pakistani SMEs

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ABSTRACT

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The aim of this study was to investigate the relationship between the use of digital accounting systems and financial reporting quality for Small and medium-size enterprises (SMEs) in Pakistan and to assess the role of internal control effectiveness in this study relationship. The survey design was quantitative, cross sectional and the number of respondents were 260 accounting professionals, finance managers and SME owners who were purposively selected. A structured 5-point likert scale was used for collecting responses, and analyzed in SPSS 21.0 using descriptive statistics, Cronbach's alpha, correlation analysis and hierarchical multiple regression analysis. Hayes' PROCESS Macro Model 4 was used to examine the mediation effect, which was controlled by firm size, business age and industry category. The illustrative results indicated that total effect of digital accounting adoption on financial reporting quality was significant and positive; also, the influence of digital accounting adoption on the internal control effectiveness was significant and positive. The effectiveness of the internal control was a significant predictor of the quality of reports, and the indirect effect was significant, suggesting partial mediation. The results indicate that the level of reporting benefits from technology investments is highest when control environments are strong. Implications for SME owners, accountants and policy makers are discussed.

Introduction

In the digital transformation era, financial information is being captured, processed and reported differently in organizations. According to Vial (2019), digital transformation is a process whereby digital technologies induce strategic reactions and transform the way an organization creates value; accounting is one of the functions that is most clearly impacted. New cloud-based platforms, automated bookkeeping, and enterprise systems with integrations enable accountants to shift from data entry to analysis and advisory services (Moll & Yigitbasioglu, 2019). Studies of enterprise systems and analytics indicate that the nature of managerial information could be enhanced through the use of these technologies, both in terms of its velocity and accuracy as well as its utility (Appelbaum et al., 2017). The discussion of big data and digitization also suggests that the very nature of accounting information itself is being transformed (Bhimani & Willcocks, 2014; Warren et al., 2015). Meanwhile, scholars have warned that the profession needs to evolve its skills and controls so that it can make the best use of these tools (Richins et al., 2017).

These developments offer opportunities and opportunities are challenges for small and medium-sized enterprises (SMEs). Despite their significant role in the Pakistani economy in terms of jobs and activity, many SMEs remain in the habit of using manual or semi-manual record keeping methods, lack accounting skills and experience, or have to generate financial statements which are reliable and bank- and tax-collector friendly. Digital accounting systems could help fill the gap but trustworthy reporting is not a function of technology. The quality of numbers reported is also dependent on the process surrounding the numbers, including internal control. The Committee of Sponsoring Organizations of the Treadway Commission (COSO, 2013) defined internal control as an integrated system of the control environment, risk assessment, control activities, information and communication, and monitoring. The accounting literature indicates that the relationship between internal control and reliability of financial information is very close (Chalmers et al., 2019).

For larger firms it can be inferred from empirical evidence that internal control deficiencies are correlated with reporting quality. Doyle et al. (2007) identified firm characteristics (e.g., size, complexity, resource constraints) as factors related to control weaknesses, and Ashbaugh-Skaife et al. (2008) demonstrated a positive relationship between control weaknesses and actual quality before remedial measures were taken and the reverse relationship after remedial measures were implemented. The results are consistent with the general findings of earnings and reporting quality as being linked to firm fundamentals, governance and accounting practices (Dechow et al., 2010). Smaller companies have limited evidence, but some research in emerging economies has indicated that internal control activities and managerial behaviour contribute to the sustainability of small companies (Bruwer et al., 2018).

Although there is increasing interest, there are three gaps. First, there is a lack of studies that directly connect digital accounting to quality of financial reporting in SMEs. Second, although it is a plausible pathway, the mechanism by which technology affects the quality of reporting has not been tested, except in a handful of situations. Third, there is little evidence in Pakistan. To tackle these gaps, this study attempted to assess the impact of the adoption of digital accounting systems on financial reporting quality and examined the role of internal control effectiveness as an intervening variable using a cross-sectional survey (Sekaran & Bougie, 2016) and a bootstrapped mediation approach (Hayes, 2022; Preacher & Hayes, 2008). The study is also a contribution to understanding the mechanisms by which the adoption of technology can occur, directly or indirectly via control systems, or both.

Literature Review

Digital accounting adoption is defined as the percentage of organizations that use computer software and cloud-based solutions to record, process, store and report financial transactions. On a conceptual level, it can be considered as part of the broader digital transformation, where companies use various technologies together with new working practices to transform value creation (Vial, 2019). The internet has changed the way accountants work over the last decade, with technologies like cloud, mobile access and automation changing the type of work and information that can be provided (Moll & Yigitbasioglu, 2019). Bhimani and Willcocks (2014) contended that digitisation will change accounting information, making it more voluminous, more granular and more timely; Warren et al. (2015) predicted that big data will expand the scope of accounting beyond financial data. The arguments suggest that digital systems increase firms' ability to generate both timely and relevant information, both important elements of reporting quality.

Evidence of the performance impact of digital systems is positive but contingent. Appelbaum et al., (2017) examined the impact of business analytics and enterprise systems on managerial accounting and found that enterprise systems enhance information availability and decision support, but with varying degrees of quality of implementation. Richins et al., (2017) noted that analytics provide accountants with opportunities but also require new skill sets, suggesting that analytics are not intended to result in improved outputs. This conditionality could be particularly high for SMEs as it may be difficult to find experts and resources. However, automation will minimize manual entry, ensure consistency in recording and provide audit trails that should enhance the verifiability and accuracy of financial statements.

A more common definition of financial reporting quality is the faithful representation of a firm's economic position in financial reports and their usefulness for decision-making. Dechow et al., (2010) examined proxies for earnings quality and noted that the quality depends on the context and is influenced by the attributes of the firm, its governance structure, and accounting systems. Relevance, faithful representation, comparability, verifiability, timeliness and understandability are the six qualitative characteristics of quality which are commonly operationalized in the survey approach. SMEs typically do not have market-based measures, and perceptual measures filled out by knowledgeable people who are familiar with the companies in question are a viable method for capturing these attributes as long as method bias is managed (Podsakoff et al., 2012).

Internal control is the one aspect of reporting reliability that is most commonly thought of. According to COSO (2013), effective internal control is the presence and operation of the five components of internal control that provide reasonable assurance of

reliable reporting, compliance and operational effectiveness. In an accounting literature review, Chalmers et al. (2019) summarized the various elements of internal control and its consequences, and there is stable evidence that greater internal control leads to better information. The results are similar to those of Doyle et al. (2007) showing that the vulnerability of the firm and the complexity of its operations is positively associated with disclosing material control weaknesses in the footnotes, which is pertinent to the SMEs involved in this study that have limited resources. Further evidence of a causal relationship between control and reporting outcomes comes from Ashbaugh-Skaife et al., (2008) who found that accrual quality was negatively affected by control deficiencies and was improved by remediation. It is not only in the small-business environment that it is established that internal control activities and managerial conduct are significant to business sustainability as demonstrated by Bruwer et al. (2018).

Digital systems and internal control are likely to be mutually reinforcing. Automated solutions include access controls, validation, approval workflows and automatic reconciliation, which enhance control activities and monitoring, and limit opportunity for error and manipulation (Appelbaum et al., 2017; Moll & Yigitbasioglu, 2019). Better information flows also contribute to better information and communication aspects of control (COSO, 2013). When digital adoption enhances internal control, and effective control enhances reporting quality, internal control is likely to yield some of the benefits of digital. This logic resonates with the notion that technology benefits require complementary organizational capabilities (Richins et al., 2017; Vial, 2019).

Appropriate statistical procedures are needed to test such a pathway. The product of coefficients approaches with bootstrapped confidence intervals are recommended over the causal steps method as the bootstrapped approach does not assume a normal distribution of the indirect effect and is more powerful (Hayes, 2022). Assumptions of normality, linearity, multicollinearity, and independence of residuals should be checked prior to running regression in survey research (Ghasemi & Zahediasl, 2012; Hair et al., 2019), and when the items used in the survey are measured by a single informant, the possibility of common method variance should be considered (Podsakoff et al., 2012). Although limited in ability to conclude causation, cross sectional designs are widely used and are an effective method for studying relationships between organizational constructs (Sekaran & Bougie, 2016).

Based on the literature, four hypotheses were formulated. H2: Digital accounting benefits the quality of financial reporting. The relationship between the adoption of digital accounting and the effectiveness of internal control is positive. The internal control effectiveness positively affects financial reporting quality. H4: The effectiveness of internal control is a mediator between digital accounting adoption and financial reporting quality.

Methodology

Research Design

The study used positivist philosophy, quantitative and cross-sectional survey. The selection of this design was based on the purpose which was to test hypothesized relationships between measurable constructs at one time with standardized data that would be analyzed statistically (Sekaran & Bougie, 2016). The unit of analysis was the SME and each respondent was an SME.

Population and Sampling

The target population were accounting professionals, finance managers and owners of SMEs from major commercial centers of Pakistan namely, Karachi, Lahore, Islamabad-Rawalpindi and Faisalabad. The financial statement preparers, financial statement supervisors, and the persons using financial statements were selected because they were directly involved in the preparation, supervision, or use of financial statements and thus had the ability to evaluate the accounting system, the control environment, and the quality of financial statements reporting. The respondents were selected using purposive sampling to have enough knowledge and experience. The inclusion criteria were that the participants had to be employed in an SME that implemented some type of computerised accounting, had to have a financial or ownership position of at least two years and agreed to be part of the study. An a priori power analysis for multiple regression with six predictors, a medium effect size ($f^2 = .15$), power of .95 and a significance level of .05 suggested a minimum sample of around 146, and a target sample size of 260 was set to be greater and to provide stability for bootstrapped estimates. A total of 340 questionnaires were

given out and 288 were returned (76.5% of the number of questionnaires distributed), and 28 questionnaires were excluded due to incompleteness or straight lining.

Instrument Development

The primary data was gathered using a structured questionnaire in English and some clarifications were offered in Urdu for those who had asked for them, as English is the language of business documentation in Pakistan. This instrument had four

parts. Demographic and firm attributes were first captured such as the role of the respondent, size of the firm, age of the business and industry sector. The other sections were rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree) for the three study constructs. The level of digital accounting adoption was assessed using eight items, which included the use of accounting software, cloud storage, automated posting and reconciliation, integration with tax and banking systems, and digital reporting. For the purpose of measuring internal control effectiveness, ten items from five of the COSO (2013) components were adapted and two items were used for each component. The financial reporting quality was assessed using eight indicators of relevance, faithful representation, comparability, verifiability, timeliness and understandability. The items were adapted from previous literature and adapted for the context of SME. Three academics and two practicing chartered accountants with content validity, clarity, and relevance experience reviewed the draft and the wording for four items was changed as a result of this review.

Pilot Testing

A pilot testing was done with 30 pilot test respondents that are not in final sample. In the pilot testing, the pilot confirmed that the questionnaire would take about 12 minutes to complete, identified two items that were vague and reworded, and found the Cronbach's alpha values ranged between .84 and .90 for the three scales, which is satisfactory before full testing.

Data Collection Procedure

Data was collected over about a 10 week period. The respondents were tapped via professional contacts, chambers of commerce and accounting firms, and a cover letter was used to explain this study. Questionnaires were sent by mail and online forms and reminders were sent after two weeks to increase the response rate.

Ethical Considerations

Moral issues were respected throughout. Full informed consent (both verbal and written or electronic) was obtained, respondents were informed that they were free to withdraw at any time, and no personal or company names were gathered. Responses were kept in password-protected files; they were used only for academic purposes; responses were reported in an aggregate form. Research with humans adhered to institutional research ethics guidelines.

Data Analysis Techniques

The data were analyzed using SPSS. Data screening started with the checks for missing values, outliers and straight lining. Descriptive statistics were used to provide a summary of the sample and variables and Cronbach's alpha was used to evaluate internal consistency with values of .70 and above deemed acceptable (Hair et al., 2019). To investigate bivariate relationships, Pearson correlation analysis was used. Hierarchical multiple regression was then run in three steps: control variables (firm size, business age and industry category) were added first, followed by digital accounting adoption, and lastly add the internal control effectiveness. Firm size was nominally coded as 1 = micro, 2 = small, and 3 = medium; business age was as years in business and industry was dummy coded as 1 = services, 0 = manufacturing or trading.

Statistical Assumptions

Prior to interpretation, statistical assumptions were tested. Skewness and kurtosis values were used to assess normality and the visual inspection of the histograms and normal probability plots were used, in which an absolute skewness and kurtosis below 1.0 were considered acceptable (Ghasemi & Zahediasl, 2012). Scatter plots of standardized residuals versus standardized predicted values were used to check for linearity and homoscedasticity. The multicollinearity was checked using variance inflation factors (VIF) and tolerance value, if VIF is less than 5, then there is no problem (Hair et al., 2019). Durbin-Watson statistic was used to ensure independence of residuals. In order to test common method bias, a single-factor test was employed (Podsakoff et al., 2012) because a single respondent answered all constructs, and the procedures of neutral wording of the items and anonymity were used.

Mediation Analysis

Hayes' PROCESS Macro Model 4 was employed to test the mediation effect of the internal control effectiveness, and the independent variables were digital accounting adoption, the mediator variable was the internal control effectiveness, and the dependent variable was financial reporting quality. The covariates were firm size, business age, and industry category. Indirect effect was estimated using 5,000 bootstrap resamples and 95% bias-corrected confidence intervals, and was deemed significant when the interval did not contain zero (Hayes, 2022; Preacher & Hayes, 2008). All other tests were deemed to be statistically significant at the .05 level.

Data Analysis and Results

The 260 usable responses were screened prior to analysis. All values of missing data were zero, no multivariate outliers were found by Mahalanobis distance and the skewness and kurtosis values were within ± 1.0 (Table 2). There was no multicollinearity, as evidenced by maximum VIF of 1.84 and tolerance values greater than .54. The Durbin-Watson statistic was 1.94, the residual plots were linear and homoscedastic, and Harman's single factor test yielded one factor accounting for 38.6% of the variance, which is less than 50%, therefore common method bias was not deemed to be a serious problem.

Respondent and Firm Profile

The profile of the respondents and the firms is presented in table 1. The sample was evenly distributed by the role of the respondent and by industry, with small firms being the largest.

Table 1

Demographic Characteristics of Respondents and Firms (N = 260)

Characteristic	Category	n	%
Respondent role	Accounting professional	98	37.7
	Finance manager	91	35.0
	SME owner	71	27.3
Firm size	Micro	58	22.3
	Small	124	47.7
	Medium	78	30.0
Industry category	Manufacturing	82	31.5
	Trading	96	36.9
	Services	82	31.5
Business age (years)	$M = 11.4, SD = 6.8$		

Note. Percentages may not sum to 100 because of rounding.

Descriptive Statistics and Reliability

Analyzing data using descriptive statistics and reliability. Descriptive statistics and reliability coefficients are shown in Table 2. The digital adoption and internal control scores exceeded the .70 threshold, and the mean scores were at moderately high levels of digital adoption, internal control, and reporting quality.

Table 2

Descriptive Statistics and Reliability of Study Variables

Variable	Items	M	SD	Skewness	Kurtosis	Cronbach's α
Digital accounting adoption	8	3.84	0.62	-0.41	0.27	.89
Internal control effectiveness	10	3.91	0.58	-0.36	0.19	.91

Variable	Items	M	SD	Skewness	Kurtosis	Cronbach's α
Financial reporting quality	8	3.97	0.55	-0.52	0.44	.88

Note. $N = 260$. All items were measured on a five-point Likert scale.

Correlation Analysis

Table 3 shows that all three variables were positively and significantly correlated. The correlation values were generally moderate to strong and the highest correlation was between the financial reporting quality and effectiveness of internal controls.

Table 3

Pearson Correlations Among Study Variables

Variable	1	2	3
1. Digital accounting adoption	—		
2. Internal control effectiveness	.62**	—	
3. Financial reporting quality	.58**	.67**	—

Note. $N = 260$. ** $p < .01$ (two-tailed).

Hierarchical Regression Analysis

The hierarchical regression predicting financial reporting quality is reported in Table 4. In Model 1, the control variables accounted for 6% of the variance, and only the size of the firm was significant. Including digital accounting adoption in Model 2 accounted for an additional 33% of the explained variance and including internal control effectiveness in Model 3 accounted for an additional 17% of the explained variance. Finally, in the last model, both predictors were significant with the standardized coefficient of digital accounting adoption being reduced from .53 to .24, a pattern consistent with a mediation effect.

Table 4

Hierarchical Multiple Regression Predicting Financial Reporting Quality

Predictor	Model 1 β	Model 2 β	Model 3 β
Firm size	.19**	.08	.05
Business age	.08	.04	.03
Industry (services)	.10	.06	.04
Digital accounting adoption		.53**	.24**
Internal control effectiveness			.49**
R^2	.06	.39	.56
Adjusted R^2	.05	.38	.55
ΔR^2	.06	.33	.17

Predictor	Model 1 β	Model 2 β	Model 3 β
<i>F</i>	5.45**	40.80**	64.70**
ΔF	5.45**	137.90**	98.10**

Note. *N* = 260. Coefficients are standardized. Model 1 *df* = 3, 256; Model 2 *df* = 4, 255; Model 3 *df* = 5, 254. ***p* < .01.

Mediation Analysis

The PROCESS Model 4 results are shown in Table 5. The adoption of digital accounting has a fairly strong association with internal control effectiveness ($a = 0.56$), which supports H2. Controlling for digital adoption, the internal control effectiveness was a significant predictor of reporting quality, supporting H3 ($b = 0.46$). The total effect of digital adoption on reporting quality was significant ($c = 0.47$), confirming H1, and the direct effect of digital adoption on reporting quality was still significant when H2, the mediator was added ($c' = 0.21$). The indirect effect was positive at 0.26 and the bootstrap confidence interval did not contain zero, suggesting the support of H4. The total effect was partially mediated (about 55%) by the indirect effect.

Table 5

Mediation Analysis Results Using PROCESS Model 4 (5,000 Bootstrap Resamples)

Path	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	95% <i>CI</i>
Digital adoption → Internal control (<i>a</i>)	0.56	0.045	12.44	< .001	[0.47, 0.65]
Internal control → Reporting quality (<i>b</i>)	0.46	0.050	9.20	< .001	[0.36, 0.56]
Total effect (<i>c</i>)	0.47	0.050	9.40	< .001	[0.37, 0.57]
Direct effect (<i>c'</i>)	0.21	0.050	4.20	< .001	[0.11, 0.31]
Indirect effect ($a \times b$)	0.26	0.040			[0.18, 0.34]

Note. *N* = 260. Firm size, business age, and industry category were entered as covariates. *B* = unstandardized coefficient. The bootstrap CI for the indirect effect is bias-corrected. $R^2 = .41$ for the mediator model and .56 for the outcome model.

Discussion

This To test the hypothesis that adoption of digital accounting system has a positive impact on the quality of financial reporting in the Pakistani SMEs and whether the relationship between DAS and financial reporting quality can be explained by the effectiveness of internal control. The results of the illustration were in agreement with all four hypotheses. Unlike other models, the total effect of the digital accounting adoption on reporting quality (H1) was found to be significant and positive, in line with the argument that digitization makes accounting information more timely, accurate and useful (Appelbaum et al., 2017; Bhimani & Willcocks, 2014). The discovery is also aligned with the notion that the information that accountants can offer is altered by the use of modern accounting technologies (Moll & Yigitbasiglu, 2019; Warren et al., 2015).

Digital adoption also significantly predicted effectiveness of internal control (H2). This will reinforce the concept that digital systems are embedded with controls, including access controls, validation controls, workflow approval, and automatic reconciliations, which will help reinforce COSO (2013) control activities and information controls. Automation might be a viable replacement for manual control in smaller and less well resourced companies, especially in the context of SMEs where segregation of duties can be challenging, and evidence suggests that the smaller, less resourced firms are more likely to have control weaknesses (Doyle et al., 2007).

The internal control effectiveness, in turn, was the strongest predictor of reporting quality (H3). This is consistent with the research findings that control deficiencies are associated with a decrease in accrual quality (Ashbaugh-Skaife et al., 2008) and with reviews that indicate that better control leads to better information quality (Chalmers et al., 2019). It is also consistent with the general idea that reporting quality is related not just to firm attributes (Dechow et al., 2010), but to processes within

the organization. The results of this study are congruent to those of other small-business situations in emerging markets (Bruwer et al., 2018).

There was a significant bootstrapped indirect effect, and a significant direct effect as well, which suggests partial mediation (H4). About half of the technology's impact on reporting quality was related to better internal control, and the other half may be related to direct improvements such as avoidance of transcription errors, quicker closing, and improved presentation. This pattern lends credence to the thesis that technology has the best chance of success when it is supplemented with other organizational skills (Richins et al., 2017; Vial, 2019). The indirect effect was tested in a non-normality assumption manner (Hayes, 2022; Preacher & Hayes, 2008).

The theoretical and practical implications of the results are given. In theory, they situate internal control as a mechanism that converts the adoption of technology into reporting outcomes, thus continuing the research that has largely been focused on treating the two streams separately. Reliability cannot be achieved by software alone, and SME owners should implement control procedures, user rights and monitoring routines along with software to ensure reliability. The use of system features like audit trails and automated recon should be included within a documented control framework, with the accountant or finance manager. For instance, encouraging digital bookkeeping alongside easier compliance guidelines for SMEs through training initiatives and compliance incentives by policy makers, professional bodies, and lenders in Pakistan could facilitate digital bookkeeping adoption.

Conclusion

This article explored the impact of DAS implementation on financial reporting quality and examined the mediating effect of internal control effectiveness in the context of Pakistani SMEs by applying the Hayes' PROCESS Model 4 (454) in quantitative cross sectional survey method with the sample size of 260 respondents. In the illustrative findings, it was observed that the quality of the reports is positively influenced by digital adoption both directly and indirectly via stronger internal control, partially mediated. Based on the study, it is recommended to develop technology and control together.

There are a number of caveats. However, the cross-sectional design does not allow for causal inferences, purposive sampling does not allow for generalization beyond the sample of cities surveyed, and self-reported perceptions may be subject to bias (although procedural and statistical checks were carried out). Longitudinal and/or experimental designs, perceptual and objective measures (e.g. audit opinion, error rate), moderators (e.g. digital literacy of the owner, regulatory pressure) and cross-country comparisons could be the area for future research. Last but not least, the data given in this article are just illustrative; real survey data must be used instead of the data provided before submission and publishing.

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