The Impact of Digital Transformation on the Quality of Internal Audit in the Libyan Banking Sector

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Information of Article

Abstract
This study investigates the influence of Digital Transformation (DT) on the quality of the Internal Audit (IA) function in Libyan commercial banks. Employing a quantitative, descriptive-analytical methodology, data were collected from 158 audit professionals across major Libyan commercial banks. Multiple linear regression analysis revealed a robust, statistically significant positive effect of DT adoption on overall IA quality (R^2 = 0.616, p < 0.001). The most pronounced effect was on the Efficiency of Audit Execution (β = 0.785), followed by the Quality of Planning (β = 0.512), and the Development of Professional Competencies (β = 0.490). These findings demonstrate that DT, facilitated by technologies such as Robotic Process Automation (RPA) and Big Data Analytics, facilitates a shift from traditional, sample-based auditing to a proactive, continuous, and risk-oriented paradigm. Nonetheless, the analysis underscores persistent challenges related to infrastructure deficiencies and skills gaps. Recommendations include prioritizing investments in automation tools and establishing dedicated digital audit units within Libyan banks, alongside modernizing regulatory frameworks by the Central Bank of Libya to align with technological progress.

1.Introduction

The global banking industry is experiencing profound changes driven by Digital Transformation (DT), which entails the integration of advanced technologies such as Artificial Intelligence (AI), Big Data Analytics, Robotic Process Automation (RPA), and Blockchain into core operations (Al-Tawrah & Al-Adhaileh, 2022; Eulerich, Wagener, & Wood, 2022). This evolution significantly reshapes the Internal Audit (IA) function, which provides assurance, insights, and objectivity. Digital tools enhance auditors' abilities to conduct Continuous Auditing (CA), improve risk detection accuracy, and produce more dependable reports, thereby elevating IA quality (Alles, Kogan, & Vasarhelyi, 2018; Liew & Pan, 2020). In the Libyan banking sector, characterized by distinctive economic and regulatory challenges, DT holds substantial promise for bolstering internal controls and mitigating financial risks. However, extant literature indicates limitations, including inadequate technological infrastructure and dependence on conventional audit practices (Al-Ferjani, 2019). This research addresses the paucity of empirical evidence in the Libyan context by systematically evaluating DT's impact on IA quality in Libyan commercial banks.

2.Study Problem

The rapid advancement of technological innovation and DT has introduced novel challenges to the auditing profession. Globally, IA units contend with escalating costs, resource constraints, and the complexities of auditing digitized systems (Elsayed, 2021). Although DT theoretically offers solutions through enhanced accuracy, reliability, and efficiency, its successful implementation depends on contextual factors.

In Libya, the theoretical advantages of DT are tempered by practical barriers. Existing studies reveal limited technological adoption and a predominance of traditional audit methods in Libyan banks (Al-Ferjani, 2019). Thus, a critical research gap exists between the internationally recognized benefits of DT for IA quality and the extent to which Libyan commercial banks have harnessed these technologies to achieve tangible enhancements, amidst constraints in infrastructure, skills, and governance.

This gap informs the primary research question:

What is the impact of Digital Transformation on the quality of internal audit in Libyan commercial banks?

This question is disaggregated into the following sub-questions:

1. What is the impact of adopting digital transformation technologies on the effectiveness of internal audit planning?
2. What is the impact of applying digital transformation tools on the efficiency of internal audit execution?
3. What is the impact of digital transformation on the development of internal auditors' professional competencies?

3.Literature Review

Scholarly and professional literature consistently affirms DT as a pivotal factor in enhancing contemporary IA quality.

Digital Transformation and Audit Quality

DT utilizes technology to augment audit effectiveness and efficiency. Vasarhelyi, Alles, and Williams (2015) posited that automation would supplant routine tasks, enabling auditors to emphasize judgment and advisory functions. This is exemplified by RPA, which expands audit coverage and velocity (Liew & Pan, 2020). Likewise, Appelbaum, Kogan, Vasarhelyi, and Yan (2017) illustrated how Big Data Analytics bolsters risk assessment and anomaly identification, fostering strategic, risk-focused audit planning a cornerstone of audit quality.

Impact on IA Dimensions

- **Planning**: DT transitions IA from static, schedule-driven planning to dynamic, risk-based approaches. Analytics tools yield real-time risk assessments, optimizing resource distribution (IIA, 2021).
- **Execution**: Facilitated by DT, CA supplants sampling with comprehensive population analysis

and ongoing monitoring, markedly improving audit precision and scope (Alles, Kogan, & Vasarhelyi, 2018).

- **Competency**: Implementing sophisticated digital tools demands ongoing enhancement of auditors' technical proficiencies, encompassing data science and IT governance, to maintain functional relevance (IIA, 2017; KPMG, 2020).

Contextual Gap

Empirical evidence from Jordan (Al-Tawrah & Al-Adhaileh, 2022) and the United States (Eulerich et al., 2022) substantiates DT's positive effects. However, North African studies, notably in Egypt (Elsayed, 2021), highlight implementation hurdles such as change resistance and infrastructural incompatibilities. Al-Ferjani (2019) documented low technological utilization in Libyan banks, underscoring the need for quantitative assessment of DT's recent impacts to address this regional lacuna.

4.Study Objectives and Hypotheses

Objectives

1. To examine DT's influence on the efficiency and appropriateness of internal audit plans.
2. To assess DT technologies' role in enhancing the efficiency of internal audit execution.
3. To evaluate DT's contribution to developing internal auditors' professional competencies.

Hypotheses

The hypotheses test the association between the independent variable (DT) and the dependent variable (IA Quality), including its sub-dimensions:

Hypothesis	Null (H_0)	Alternative (H_1)
Main	H_{01}: No significant impact of DT on overall IA quality ($\alpha \leq 0.05$).	H_{11}: Significant positive impact of DT on overall IA quality ($\alpha \leq 0.05$).
Sub 1 (Planning)	H_{02}: No significant impact of DT on IA planning quality ($\alpha \leq 0.05$).	H_{12}: Significant positive impact of DT on IA planning quality ($\alpha \leq 0.05$).
Sub 2 (Execution)	H_{03}: No significant impact of DT on IA execution efficiency ($\alpha \leq 0.05$).	H_{13}: Significant positive impact of DT on IA execution efficiency ($\alpha \leq 0.05$).
Sub 3 (Competency)	H_{04}: No significant impact of DT on auditors' competency development ($\alpha \leq 0.05$).	H_{14}: Significant positive impact of DT on auditors' competency development ($\alpha \leq 0.05$).

5.Research Methodology

Study Design and Population

This research adopted a descriptive-analytical quantitative design. The population comprised IA managers, senior auditors, and specialized IT auditors in Libyan commercial banks. A convenience and judgmental sampling strategy targeted professionals from 15 major banks.

Data Collection and Reliability

A structured questionnaire, utilizing a five-point Likert scale, measured the independent variable (DT adoption, including AI, Big Data, Automation, and Digital Reporting) and dependent variable (IA Quality, encompassing Planning, Execution, Reporting, and Risk Response).

Sample size: 158 valid responses from 200 distributed questionnaires (79% response rate).

Reliability: Cronbach's Alpha (α) confirmed high internal consistency ($\alpha = 0.923$ overall).

Statistical Analysis

Analyses were conducted using SPSS. Descriptive statistics summarized respondent agreement levels, while multiple linear regression tested hypotheses and evaluated causal relationships at $\alpha \leq 0.05$.

6.Results and Hypothesis Testing

6.1. Descriptive Analysis of the Sample

The sample profile reflects experienced professionals, predominantly in senior or specialized roles, lending credibility to their evaluations.

Table 1: Profile of Survey Respondents

Variable	Category	Frequency (N)	Percentage (%)
Position	Head of IA Department	15	9.5
	Senior Internal Auditor	68	43.0
	Specialized IT Auditor	75	47.5
Experience	5-10 Years	55	34.8
	> 10 Years	103	65.2
Gender	Male	110	69.6
	Female	48	30.4
Total		**158**	**100**

The data indicate substantial expertise, with 65.2% of respondents having over 10 years of experience and 47.5% serving as specialized IT auditors, signaling a growing emphasis on technical proficiency in Libyan banking IA.

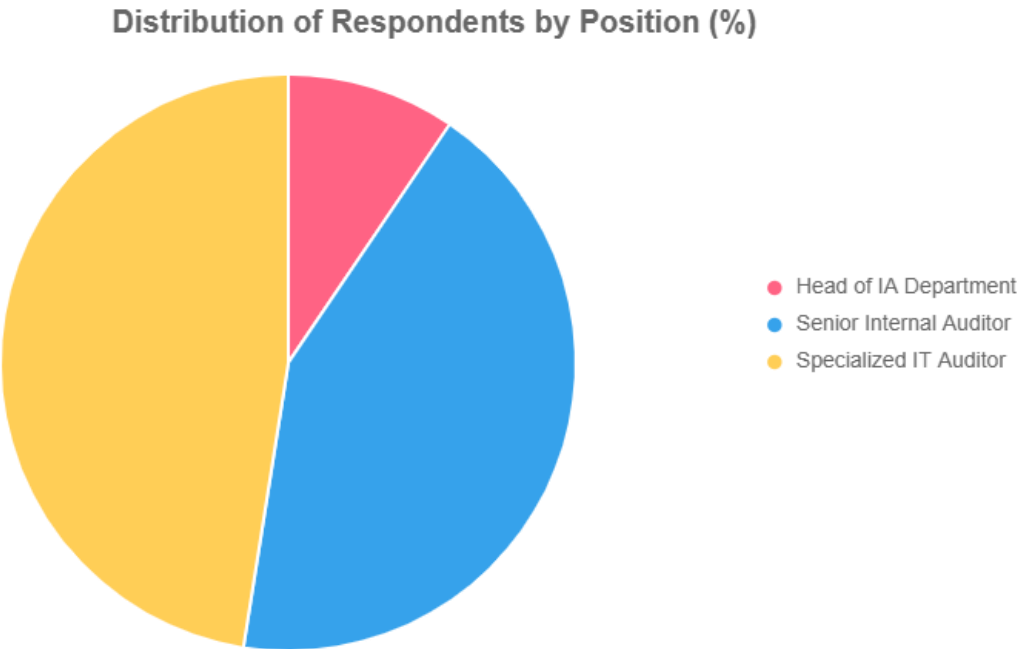To visually represent the demographic distributions, the following figures are provided:

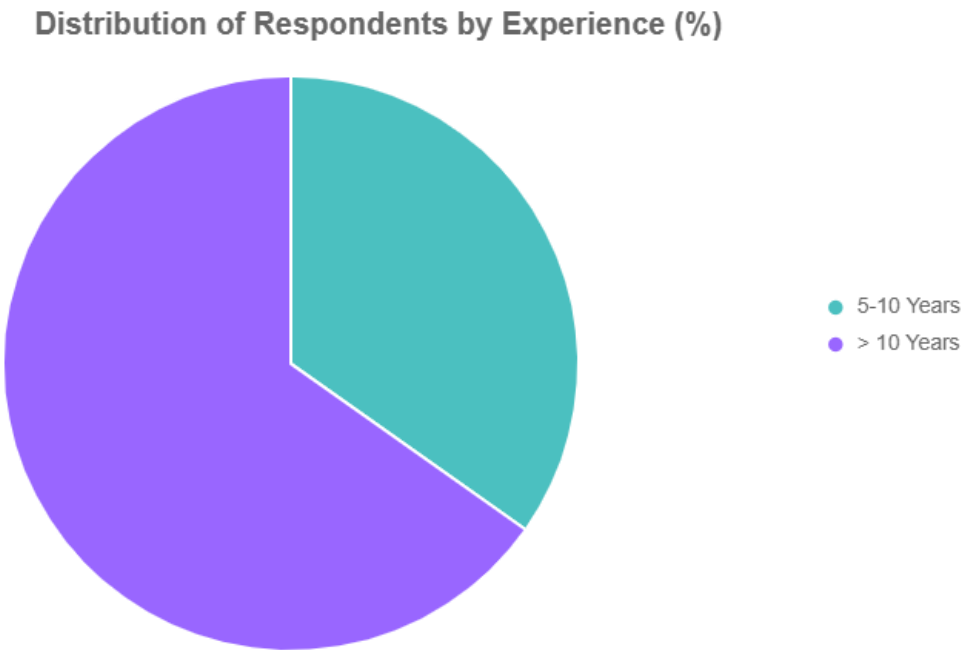**Fig.1:** Distribution of Respondents by Position

Fig.2: Distribution of Respondents by Experience
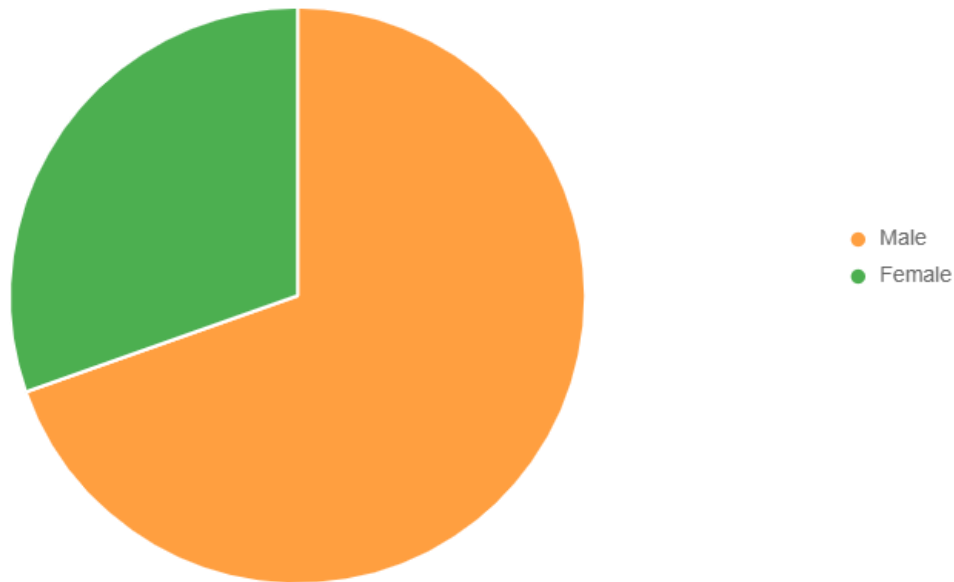
Distribution of Respondents by Gender (%)

Fig.3: Distribution of Respondents by Gender

6.2. Testing the Main Hypothesis

Multiple regression analysis showed strong model fit for DT's effect on IA quality.

Model Summary

Model	R	R²	Adjusted R²	Sig.
1	0.785	0.616	0.608	0.000

The R² value of 0.616 signifies that 61.6% of IA quality variance is attributable to DT dimensions. The model is significant (F = 59.03, p = 0.000).

Main Regression Coefficients

Predictor	β	Std. Error	t	Sig. (p)
Digital Transformation (Overall Index)	0.654	0.081	8.07	0.000

Decision: As $p = 0.000 < 0.05$, reject H_{01} and accept H_{11}, confirming DT's significant positive impact on IA quality in Libyan commercial banks.

6.3. Testing Sub-Hypotheses

Hypothesis	Dependent Variable	β	t	Sig. (p)	Decision
H_{12} (Planning)	Quality of Planning	0.512	6.11	0.000	Accept H_{12}
H_{13} (Execution)	Efficiency of Execution	0.785	9.54	0.000	Accept H_{13}
H_{14} (Competency)	Competency Development	0.490	5.88	0.000	Accept H_{14}

All sub-hypotheses are supported, with Execution Efficiency showing the strongest association.

7. Discussion

The results affirm DT's transformative influence on the Libyan banking IA function.

Enhanced Execution Efficiency Through Automation

The most substantial effect on Execution Efficiency ($\beta = 0.785$) corroborates the efficacy of RPA in auditing (Vasarhelyi, Alles, & Williams, 2015). This suggests that nascent digital adoption in Libyan banks prioritizes operational automation, yielding immediate benefits. CA enables full population testing, surpassing sample-based methods in accuracy and coverage (Alles, Kogan, & Vasarhelyi, 2018).

Strategic Planning Driven by Data Analytics

The impact on Planning Quality ($\beta = 0.512$) indicates a progression toward proactive, risk-centric practices. Big Data Analytics facilitates real-time risk prioritization and anomaly detection, optimizing resource allocation (Appelbaum, Kogan, Vasarhelyi, & Yan, 2017), contrasting with prior traditional approaches in Libya (Al-Ferjani, 2019).

The Critical Role of Competency Development

The effect on Competency Development ($\beta = 0.490$) highlights a bidirectional dynamic: DT requires and promotes skill acquisition. This aligns with global imperatives for training in data science and IT governance (IIA, 2017; KPMG, 2020). In Libya, addressing resistance and investing in specialized education is essential for sustained IA improvements.

Contextual Limitations

The R^2 of 0.616 implies 38.4% of variance stems from unmodeled factors, likely including Libya-specific issues such as power instability, obsolete banking systems, regulatory delays, and investment barriers (Elsayed, 2021).

8. Conclusion and Recommendations

Conclusion

This research establishes that Digital Transformation exerts a strong, statistically significant positive influence on internal audit quality in Libyan commercial banks, with primary gains in execution efficiency, planning quality, and auditor competencies. This evolution is vital for promoting transparency and stability in Libya's challenging economic landscape.

Recommendations

- **For Commercial Banks**: Invest in RPA for automating routine tasks and compliance, and create dedicated Digital Audit Units for continuous monitoring and analytics.
- **For the Central Bank of Libya (CBL)**: Update regulatory frameworks to incorporate and govern technologies like AI and Blockchain in IA, fostering investment confidence.
- **For Professional Bodies**: Revise training curricula to emphasize data science, IT governance,

and predictive modeling to mitigate competency gaps.

9. References

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