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The impact of digital transformation on predicting stock returns: The mediating role of profitability indicators evidence from industrial companies listed on the Iraq Stock Exchange

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Abstract:

The digital transformation of industrial companies plays a prominent role in increasing their market share and thus increasing their ability to compete, survive, and grow. The current study aims to measure and analyze the impact of digital transformation on predicting stock returns through profitability indicators. The study population consisted of manufacturing firms traded on the Iraq Stock Exchange, from which representative sample was drawn. The study focused on a sample of (7) manufacturing firms traded on the Iraq Stock Exchange, and the selected time series was (12) years, i.e., from (2012) to (2023). A set of statistical methods was used, utilizing multivariate regression analysis and t-statistical evaluation. The (Eviews 10) and (smart-pls 4) software were used in the analysis and hypothesis testing. A set of conclusions was reached, the most important of which is that companies that adopt smart production systems and where Companies with a higher proportion were better to exploit investment opportunities, which positively affected stock return can exploit investment opportunities optimally, and thus increase their returns, which is reflected positively on the earnings per share and the stock dividend, which ultimately leads to an increase in their stock returns. Based on these findings, a set of recommendations was made, most importantly the need for industrial companies to adopt smart production systems and increase their spending on research and development. These measures enhance their ability to capitalize on investment opportunities and thus increase their returns.

Keywords: Digital transformation, stock returns, industrial companies.

Introduction:

The current era is witnessing a massive wave of digital transformation, representing a qualitative leap in how businesses are managed and services are delivered. This transformation is not limited to simply adopting modern technologies, but includes a comprehensive restructuring of processes, strategies, and organizational culture to extract maximum value from digital data and communications, creating innovative business models and increasing competitiveness. Digital transformation has become a key driver of financial performance and operational efficiency for companies globally. By adopting solutions such as big data analytics, industrial automation, artificial intelligence, smart production systems, and the Industrial Internet of Things (IIoT), companies can improve their operations, reduce costs, and make more informed decisions, which ultimately reflects positively on profitability and growth indicators. The problem addressed in this study is the weak ability of companies and their lack of reliance on sound standards for forecasting future returns on their own

stock or the returns of companies operating in the same sector. The importance of this study stems from the significance of the topics it addresses, as well as the vital sector it examines. Furthermore, the study presents a set of mechanisms that significantly contribute to increasing companies' ability to compete, survive, and grow.

1. Literature reviews of study:

1.1 The Concept of Digital Transformation

Digital transformation has emerged as a significant phenomenon in the literature (Piccinini et al., 2015; Bharadwaj et al., 2013) and among practitioners. It encompasses the radical changes occurring across various sectors through the use of digital technologies (Majchrzak et al., 2016: 228). Vial (2021: 14) indicates that companies must find ways to innovate using these technologies by developing strategies that embrace the effects of digital transformation and enhance operational performance. Digital transformation is one of the most important factors contributing to rapid progress on all levels. It is viewed as an engine of change in all contexts, particularly in the business context. Digital transformation refers to the changes arising from digital technologies and the automation of processes through information technology. The term "transformation" includes the ease with which companies can take necessary actions when faced with new technologies; it should not be confused with simple change (Kraus et al. (al., 2021:4), and Table (2) below shows the definitions of digital transformation.

1.1.1Measuring Digital Transformation

Digital transformation is evaluated through the ratio of digital assets to total assets. The higher this ratio, the more the company is committed to adopting digitalization in its operations (Fitzgerald et al., 2014:5; IASB, 2018). This ratio is calculated using the following equation: (Bughin, 2018; Westerman et al., 2014).

$$DA = \frac{TA + INA}{TA}$$

Where:

DA: Digital assets.

$TA, INTA$: Tangible assets, Intangible assets.

TA: Total assets.

1.2 The Concept of Profitability Indicators

Profitability indicators play a crucial role in analyzing a company's financial activities. These indicators allow for the evaluation of a company's ability to generate returns (Agabekova et al., 2023: 20). Financial managers typically use these indicators to assess a company's effectiveness in generating returns (Al-Busaidi & Al-Muharrami, 2021: 904). They are a set of basic financial ratios and metrics used to evaluate a company's ability to generate profits relative to its revenues, assets, or owners' equity over a specific period. These indicators help investors and management measure a company's operational efficiency (Wild et al., 2022: 145; Youssef et al., 2023: 654). Profitability indicators include the following (Robinson et al., 2015: 208):

1.2.1 Profitability Indicators

1- Return on Assets (ROA): This is a metric used to measure a company's effectiveness in generating profits through the use of its assets. The higher this rate, the greater the company's returns. The ROA is calculated using the following equation: (Alabassi et al., 2022: 36).

$$ROA = \frac{NI}{TA}$$

Where:

ROA: Return on Assets.

NI: Net Income.

TA: Total Assets.

2- Return on Equity: This is a measure used to assess a company's effectiveness in maximizing shareholder wealth. The higher this ratio, the greater the return on equity. ROE is calculated using the following equation: (Alabassi et al., 2022: 37).

$$ROE = \frac{NI}{E}$$

Where:

ROE: Return on Equity.

NI: Net Income.

E: Equity.

1.3 The Concept of Stock Return

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Recent literature has shown researchers' interest in studying return on equity, as it is an influential tool in the field of management in general and financial management in particular (Reddy & Narayan, 2016: 194). According to Julianto & Syafarudin (2019: 103), stock return is one of the factors that motivate investors to invest and is a reward offered to investors as a result of their risk tolerance. Stock Return is a key metric for investors to evaluate the performance of their stock investments and compare them with other investment vehicles or market indices (Bodie et al., 2014: 122; Reilly & Brown, 2012: 87).

Reddy & Narayan (2016: 194) define stock return as the income generated from investors investing their savings in the stock market, which may take the form of dividends earned from stock trading or dividends. Julianto & Syafarudin (2019: 103) define stock return as the profits (capital gains) generated from stock trading over a specific period. Acheampong et al. (2014: 126) define stock return as the return expected by investors, which takes the form of dividends and capital gains (stock price appreciation).

1.3.1 Measuring Stock Return

stock return is measured using the following equation: (Acheampong et al., 2014: 128)

$$r_t = \frac{P_t - P_{t-1}}{P_{t-1}} \quad (4)$$

Where:

r_t: Return on equity at period t.

P_t: Price of equity at period t.

$P_{(t-1)}$: Price of equity at period t-1.

2. Theoretical analysis and building hypothesis:

1. Digital transformation has no significant impact on predicting stock returns.
2. Digital transformation has no significant impact on return on investment.
3. Digital transformation has no significant impact on return on equity.
4. Profitability indicators have no significant impact on predicting stock returns.
5. Digital transformation has no significant impact on predicting stock returns through profitability indicators.

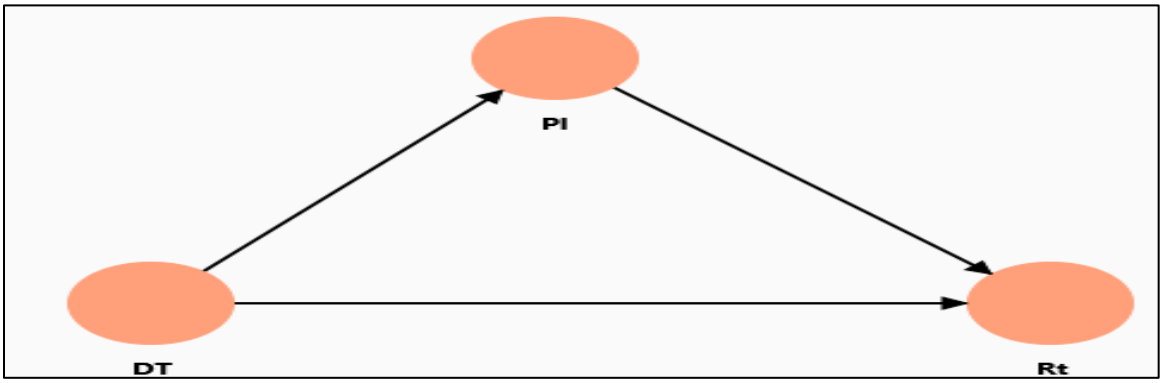


Figure (1) Hypothetical Study Plan.

3.Study Population and Sample

The study population consisted of industrial companies listed on the Iraq Stock Exchange. A purposive sample of (7) industrial companies was selected from these companies. The selection criteria included their continued operation during the period (2012-2023), as well as the availability of data in reports and publications issued by the Iraq Stock Exchange and the Securities Commission.

4. Results analysis:

4.1 Normality Test and Statistical Description

The normality test is one of the important statistical tests that supports the accuracy of the results. The Jarque-Bera test will be used to determine whether a normality exists. Furthermore, the statistical description will be tested by calculating the standard deviation results, as illustrated Table below.

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Table (1) The Normality Test and Statistical Description.

DA	DA_1	DA_2	DA_3	DA_4	DA_5	DA_6	DA_7
Std. Dev.	0.347700	0.091540	0.077509	0.089297	0.203646	0.024329	0.094051
Jarque-Bera	1.369964	1.314331	1.981181	1.138283	0.534045	0.543559	0.441757
Probability	0.504099	0.518319	0.371357	0.566011	0.765656	0.762022	0.801814
ROA	ROA_01	ROA_02	ROA_03	ROA_04	ROA_05	ROA_06	ROA_07
Std. Dev.	0.115546	0.071789	0.962043	0.013803	0.036607	0.062930	0.048611
Jarque-Bera	2.234566	0.325922	1.726052	1.272711	0.842046	2.508673	0.424118
Probability	0.327168	0.849624	0.421883	0.529218	0.656375	0.285265	0.808917
ROE	ROE_1	ROE_2	ROE_3	ROE_4	ROE_5	ROE_6	ROE_7
Std. Dev.	0.506326	0.088896	0.094117	0.551480	0.062868	0.067462	0.060294
Jarque - Bera	2.193423	0.374223	1.450482	1.852738	1.776954	2.757766	0.518971
Probability	0.333968	0.829351	0.484208	0.395989	0.411282	0.251860	0.771448
Rt	RT_01	RT_02	RT_03	RT_04	RT_05	RT_06	RT_07
Std. Dev.	0.252249	0.372256	0.490727	0.325315	0.362104	0.306934	0.254755
Jarque-Bera	0.409591	1.241658	1.888173	2.783844	0.965288	0.346082	1.999002
Probability	0.814814	0.537499	0.389035	0.248597	0.617149	0.841103	0.368063

The source is prepared by the researcher

Based on the companies in the study sample and according to the measurement indicators, the results in Table (1) above indicate that the data are normally distributed, as the probability of Jarque-Bera being greater than (0.05). Regarding the statistical description, the standard deviation values were low for most companies.

4. 2 Autocorrelation Test

Autocorrelation occurs in the context of time series data, as an error in one period affects the subsequent period. This is especially true in cross-sectional data, and the autocorrelation problem affects the accuracy of the results. Table (2) below shows the results of the Breusch-Godfrey test to identify the presence or absence of autocorrelation.

Statistical evidence from this specific analysis indicates the absence of any

Table (2) Autocorrelation Test.

F-statistic	0.016552	Prob. F	0.9836
Obs*R-squared	0.056484	Prob. Chi-Square	0.9722
Test Equation:			
Dependent Variable: RESID			
Method: Least Squares			
Date: 07/31/25 Time: 23:23			
Sample: 2012 2023			

Source: Formulated by the authors utilizing Eviews 10 program.

The Finding in Table (2) above, based on the Breusch-Godfrey test, show that the achieved significance value is greater than (0.05), reaching (0.97). Statistical evidence from this specific analysis indicates the absence of any autocorrelation problem.

4. 3 Evaluation of Research Hypotheses

1- Examining and Evaluating the First Hypothesis: There is no significant effect of digital transformation on predicting stock returns.

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Table (3) Finding of the test on the impact of digital transformation on stock return.

Dependent Variable: RT_?				
Method: Pooled Least Squares				
Date: 07/31/25 Time: 23:46				
Sample: 2012 2023				
Included observations: 12				
Cross-sections included: 7				
Total pool (balanced) observations: 84				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.101651	0.092719	-1.096342	0.2764
DA_?	1.024116	0.065369	15.66665	0.0000
R-squared	0.764582			
Adjusted R-squared	0.742899			
S.E. of regression	0.660289			
Sum squared resid	33.13460			
Log likelihood	-80.12081			
F-statistic	35.26140			
Prob(F-statistic)	0.000000			

Source: formulated by the authors utilizing Eviews 10 program.

The finding in Table (3) above show that the explanatory coefficient reached (0.74). This result indicates that digital transformation explains (0.74) of the change in the stock return. Furthermore, the model significance reached (0.000), which is less than (0.05). This result indicates confirming the statistical validity of the overall model. As for the effect size, the beta coefficient for digital transformation reached (1.02), and the achieved significance is less than (0.05). This indicates the rejection of the null hypothesis.

2- Examining and Evaluating the second Hypothesis: There is no significant effect of digital transformation on return on investment.

Table (4) Finding of testing the effect of digital transformation on return on asset.

Dependent Variable: ROA_?				
Method: Pooled Least Squares				
Date: 08/01/25 Time: 00:15				
Sample: 2012 2023				
Included observations: 12				
Cross-sections included: 7				
Total pool (balanced) observations: 84				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.035095	0.058535	-0.599550	0.5506
DA_?	0.685266	0.041269	16.60502	0.0000
R-squared	0.787220			
Adjusted R-squared	0.767622			
S.E. of regression	0.416851			
Sum squared resid	13.20612			
Log likelihood	-41.48511			
F-statistic	40.16802			
Prob(F-statistic)	0.000000			

Source: formulated by the authors utilizing Eviews 10 program.

The finding in Table (4) above show that the explanatory coefficient reached (0.77). This result indicates that digital transformation explains (0.77) of the change in return on investment. Furthermore, the model significance reached (0.000), which is less than (0.05). This result indicates that the explanatory power of the model is statistically valid. As for the effect size, the beta coefficient for digital transformation reached (0.69), and the achieved significance is less than (0.05). This indicates the refusing of the null hypothesis.

3- Examining and Evaluating the third Hypothesis third hypothesis: There is no significant effect of digital transformation on return on equity.

Table (5) Finding of testing the effect of digital transformation on return on equity.

Dependent Variable: ROE_?				
Method: Pooled Least Squares				
Date: 08/01/25 Time: 00:28				
Sample: 2012 2023				
Included observations: 12				
Cross-sections included: 7				
Total pool (balanced) observations: 84				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.090479	0.087110	-1.038673	0.3023
DA_?	1.021257	0.061415	16.62875	0.0000
R-squared	0.785771			
Adjusted R-squared	0.766039			
S.E. of regression	0.620349			
Sum squared resid	29.24732			
Log likelihood	-74.87963			
F-statistic	39.82285			
Prob(F-statistic)	0.000000			

Source: formulated by the authors utilizing Eviews 10 program.

The finding in Table (5) above show that the explanatory coefficient reached (0.77). This result indicates that digital transformation explains (0.77) of the change in return on equity. Furthermore, the model's significance level reached (0.000), which is less than (0.05). This result indicates that the model is significant. As for the effect size, the beta coefficient for digital transformation reached (1.01), and the achieved significance level is less than (0.05). This indicates the rejection of the null hypothesis.

4- Examining and Evaluating the fourth hypothesis: There is no significant effect of profitability indicators on stock return.

Table (6) Finding of testing the effect of profitability indicators on Stock Return.

Dependent Variable: RT_?				
Method: Pooled Least Squares				
Date: 08/01/25 Time: 00:44				
Sample: 2012 2023				
Included observations: 12				
Cross-sections included: 7				
Total pool (balanced) observations: 84				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000551	0.044338	-0.012418	0.9901

ROE ?	0.618516	0.145272	4.257648	0.0001
ROA_?	0.369236	0.144747	2.550901	0.0128
R-squared	0.938180			
Adjusted R-squared	0.931585			
S.E. of regression	0.340609			
Sum squared resid	8.701104			
Log likelihood	-23.96143			
F-statistic	142.2737			
Prob(F-statistic)	0.000000			

Source: formulated by the authors utilizing Eviews 10 program.

The finding in Table (6) above show that the explanatory coefficient reached (0.93). This result indicates that the profitability indicators explain (0.93) of the change in stock return. Moreover, the model's p-value stood at (0.000), falling below the (0.05) threshold. This result indicates that the model is significant. As for the magnitude of the effect, the beta coefficient for ROE reached (0.62), and the achieved significance was less than (0.05). The beta coefficient for ROA (0.37), and the achieved significance was less than (0.05). This indicates the rejection of the null hypothesis.

5- Examining and Evaluating the fifth hypothesis: There is no significant effect of digital transformation on predicting stock returns through profitability indicators. Figure (2) and Table (7) illustrate the results of the indirect effect.

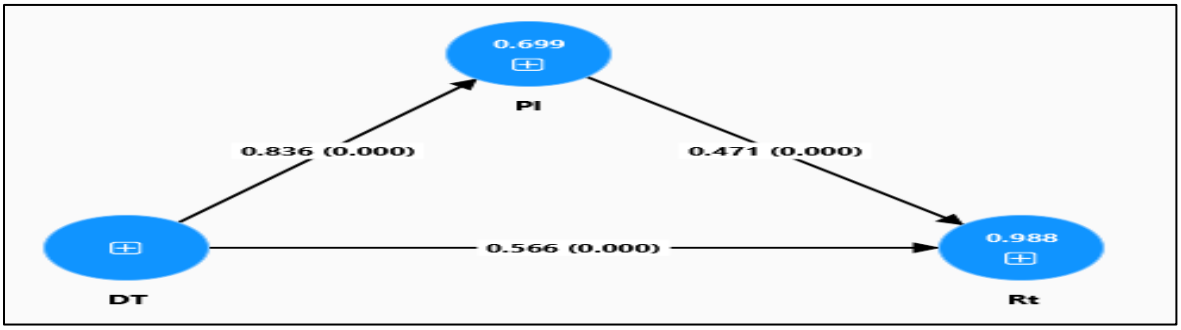


Figure (2) The impact of digital transformation on predicting stock returns through profitability indicators.

Table (7) The impact of digital transformation on predicting stock returns through profitability indicators.

	Original sample	Standard deviation	T statistics	P values
PI -> Rt	0.471	0.045	10.468	0.000
DT -> PI	0.836	0.076	12.448	0.000
DT -> Rt	0.566	0.036	15.650	0.000

Source: Smart-PLS4 program outputs

Figure (2) and Table (7) above show statistical analysis revealed that the independent variable significantly predicted the mediator (ß=0.84, p< 0.05), which in turn had a significant impact on the dependent variable (ß=0.47, p< 0.05). Consequently, the indirect effect linking the independent variable to the dependent outcome was statistically significant at (ß=0.47, p< 0.05). Therefore, it can be concluded that the profitability indicators variable acts as a mediator between the transformation variable and the stock returns variable. Based on these results, the null hypothesis is rejected.

5.Conclusions:

1. Companies that adopt smart production systems and where software and robotics constitute a high percentage of their assets (i.e., rely on automation in their production) are able to optimally exploit investment opportunities, thereby increasing their returns. This positively impacts earnings per share and dividends, ultimately leading to higher returns on their stocks. (In other words, companies that keep pace with and adapt to the digital age experience a relative increase in their stock returns.).
2. Profitability indicators are not solely a result of digital transformation, but also an effective medium for transmitting its impact to stock returns. This demonstrates that improving operational efficiency and optimizing asset utilization are the primary channels through which digitalization impacts shareholder value.
3. Digital transformation contributes to increasing stock returns by improving profitability, making it an attraction factor for investors and enhancing the long-term stability of the Iraqi market.
4. The results reflected by the study model in the Iraqi environment (despite structural challenges) prove that digital transformation can create a competitive advantage for industrial companies in emerging economies, especially when measured in relation to the tangible component (the percentage of digital assets). This makes it a realistic strategy for enhancing investment attractiveness.
5. The variation in the percentages of digital transformation or the impact of digital transformation on stock returns among industrial companies reflects their differing abilities to translate digital investment into operational efficiency. Most companies with a higher percentage of digital assets achieved growth in their stock returns, despite all being exposed to the same economic conditions.

6.Recommendations

1. Industrial companies should adopt smart production systems in their operations, in addition to increasing their spending on research and development. These measures enhance their ability to capitalize on investment opportunities and thus increase their returns.
2. The researchers recommend that industrial companies disclose profitability indicators at specific time intervals, including explanatory reports on how digital assets contribute to achieving these percentages, to help investors make informed decisions. Enlightened.
3. The necessity of developing standards that keep pace with technological development, such as a "digital maturity standard," as a prerequisite for obtaining financing from government banks and other financial institutions. This can be achieved by prioritizing financing for companies whose digital assets exceed a certain threshold, offering preferential interest rates for digital transformation projects, and developing innovative financial instruments such as digital transformation bonds guaranteed by relevant government ministries.
4. The necessity for the government to develop supportive policies, such as tax exemptions for investment in digital technology or partnerships between universities and the industrial sector to train personnel in managing digital assets. This should be accompanied by the establishment of a "national platform" to evaluate and classify companies according to their digital maturity.
5. The creation of a "phased model" for digital transformation aimed at Iraqi industrial companies, classifying them according to their current technological maturity (beginner, intermediate, advanced), and identifying investment packages tailored to each category, such as (starting with warehouse automation and applying artificial intelligence in supply chain management for advanced companies), along with providing technology incubators in partnership with local universities to support implementation.

Conflict of Interest:

The authors declare that they have no conflicts of interest.

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None.

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