
DIGITAL TRANSFORMATION IN MANAGEMENT METHODS: A CASE STUDY OF THE UNIVERSITY OF BABYLON AND AL-MUSTAQBAL PRIVATE UNIVERSITY

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ABSTRACT

This paper investigates the digital transformation in management in Iraqi higher education institutions through a comparative case study of the public University of Babylon and the private University of Al-Mustaqbal. A structured questionnaire was used in a quantitative technique to collect data from 131 faculty members of both universities. Data were analyzed using SPSS software. Hypotheses of differences in the application of digital transformation and the variables affecting it were tested using t-test and regression tests. The data shows that the University of Al-Mustaqbal has a higher level of the integration of digital technology than the University of Babylon. The private university is more developed in key areas such as digital infrastructure, process automation, and data-driven decision-making due to its greater financial freedom, competitive pressures, and an agile organizational culture. The public university, however, is plagued by budgetary constraints, bureaucratic processes and a slower pace of cultural adjustment. The study ends with concrete suggestions for improving each university's digital transformation tactics and directions for future research including longitudinal studies. This study provides valuable empirical data and practical recommendations for policy makers, academic administrators and academics interested in understanding the details of the digital revolution in a developing post-conflict economy.

Keywords: Digital Transformation, Management Methods, Higher Education, Public vs. Private Universities.

1. INTRODUCTION

Digital technologies have transformed the 21st century, changing the world's economies, businesses and communities. This shift often called "digital transformation" (DT), demands companies to rethink their structures, processes and cultures beside bringing new technologies (Vial, 2021). DT is now a pressing need in higher education, which has been traditionally associated with tradition and slow change. To remain relevant in an increasingly competitive and connected world universities have to use digital technology to improve administrative efficiency and the student experience (Hinings, Gegenhuber, & Greenwood, 2018).

Key to this transformation are the management methods of the university administration. Universities are combining Enterprise Resource Planning (ERP) systems, Customer Relationship Management (CRM) platforms, Learning Management Systems (LMS), and advanced data analysis to transform their operations (Ross, Beath, & Sebastian, 2017). Administrative work, including student admissions, registrar services, human resources, and financial management, is undergoing significant changes due to digital innovation (Mohamed et al., 2022). This will create

greater effectiveness and transparency as well as improved decision-making with data. The overall objective is to improve institutional performance and stakeholder satisfaction (Cubukcu & Aktürk, 2020).

The movement for DT in higher education is especially strong in Iraq. The nation's higher education system is still recovering from years of violence and turmoil (Escobar et al., 2023). At present, it is at a turning point where there is growing realization that to restore academic quality, nurture innovation, and promote national development, university administration must be modernized (Mahmud, 2013). This environment, which combines well-known public institutions with a fast growing private higher education industry, provides a unique backdrop for analyzing DT. Different types of institutions are characterized by their own financing arrangements, governance styles, and market forces that influence the way they approach DT and the effectiveness of their efforts.

In this essay, two Iraqi universities are compared, Al-Mustaqbal Private University which represents the more recent private sector and the reputable public University of Babylon. It deals with the lack of real comparative data on the different institutional frameworks in Iraq and the way DT is implemented through management techniques. Anecdotal evidence suggests disparities exist, but a thorough, data-driven investigation is necessary to determine the extent, nature and significance of these disparities.

The main objective of this study is to conduct a field study to measure and compare the level of digital transformation in the management methods at the University of Babylon and Al-Mustaqbal Private University. To this end, the study is guided by the following research questions:

1. What is the reality of the adoption of digital transformation in the management methods of the University of Babylon and Al-Mustaqbal Private University?
2. Is there a statistically significant difference in the level of digital transformation implementation between the public university of Babylon and the private university Al-Mustaqbal?
3. What dimensions (e.g. infrastructure, process automation, data culture) show the greatest differences in DT maturity among these universities?
4. 4. What are the key perceived challenges and drivers of digital transformation in each institutional context?

This study carries some implications. The administrators and leaders of both universities can use the data to assess the achievements and suggest potential areas for improvement. It provides evidence-based recommendations to the policymakers of Iraqi Ministry of Higher Education and Scientific Research for modernization of higher education. This article contributes to the global debate on DT in higher education and emphasizes the relationship between institutional type (public vs. private) through an empirical case study from an understudied location.

The study only focuses on the managerial strategies and does not consider the pedagogical and curriculum aspects of DT, which need further research. This sample is restricted to administrative and academic workers who had participated in the management processes, providing an insider's perspective on the transition. Cross-sectional research captures DT at a single time point. This provides important baseline data but does not capture the dynamic development of these changes over time, requiring longitudinal investigations.

2. LITERATURE REVIEW

2.1 Defining Digital Transformation

Technology is at the heart of teaching and learning in this revolution that has transformed education at private universities. Among its most obvious benefits is the enhanced interaction it generates between students and teachers through digital media. The communication will be improved, the effectiveness of the educational process will improve. Majdi et al. (2024)

Digital transformation definitions are often ambiguous. The term is also often confused with digitization, which is the conversion of analog information into digital form, and digitalization, which means employing digital technologies to improve existing processes. DT, in contrast, is a larger and more meaningful change. “A process that aims at improving an entity, by inducing significant changes to its properties through combinations of information, computing, communication and connectivity technologies” (Vial, 2021). The definition makes clear DT is not simply about technology but about changing fundamental attributes of the entity itself. That, of course, means rethinking the business model, culture, operations and value propositions of the organization (Li, 2020). If the data is posted on the web at a university, that’s not a violation. It would need to rethink how it is run, how decisions are made and how it creates value for students, staff and society. Successful DT, according to Westerman, Bonnet and McAfee (2014), is a function of two things: digital capacity (the technology itself) and leadership capability (the vision and governance to drive transformation).

2.2 Digital Transformation in Higher Education

The global higher education industry has been relatively slow to embrace large-scale DT compared to other sectors such as banking or retailing (Hinings et al., 2018). But the pressure is mounting now. Universities are facing a ‘perfect storm’ of increasing costs, increasing competition between students and staff, increasing public and governmental expectations for accountability and changing student expectations for a seamless technology-enabled experience (Eesley et al, 2025). DT is considered a purposeful reaction to these issues.

DT is used in many ways in higher education. On the administrative side, that translates into integrated ERP systems that smooth HR, finance and student administration. It involves the use of CRM systems to manage interactions with current and prospective students, alumni, and benefactors (Habib et al., 2021). It also addresses the use of analytics and business intelligence (BI) technologies to move from reactive reporting to proactive data-driven decision making in areas like resource allocation, course design, and student retention (Ross et al., 2017). The aim is to offer a “single source of truth” for institutional data, removing the notorious data silos that bedevil many institutions (Gaftandzhieva et al, 2023).

2.3 Public vs. Private University Dynamics and DT

Whether a university is publicly or privately funded and run is a major consideration in terms of the DT strategy and how it is implemented. Most public universities are state funded, governed by bureaucratic systems and have broad social mandates to do things like make higher education more accessible and do research that benefits the public interest. Private colleges may be more agile in their operations and may be supported by tuition and private endowments (Dill, 2016).

Information technology is a powerful tool and a great motivator for improving the quality and viability of public and private schools. Therefore, almost all schools in today's world are implementing some type of information technology system as a part of their drive to keep competitive. These systems help to make the administration of educational institutions more effective and efficient. Winarno, Aini (2023)

These anatomical abnormalities have important implications for DT. The competition among private colleges to attract students is fierce (Zabalawi et al., 2024), and this could lead to investments in technology that improves the student experience and operational efficiency. Their organizational structures could allow for faster decision making and more direct funding of DT projects. Findings from Mergel et al. (2017) on public sector firms can be translated to public universities and indicate that bureaucratic slowness and risk-averse cultures may considerably hinder the adoption of DT. Traditional procurement procedures, civil service regulations for IT staff, and annual budgeting cycles are unflexible in the face of generally iterative and fast-paced digital initiatives.

In contrast, public institutions may have an advantage on account of their size, longevity and the fact that they are required to invest in digital infrastructure in a long-term perspective. Common challenges, however, include legacy systems, complex stakeholder landscapes (e.g., faculty unions, student governments, and state oversight organizations), and a culture that may be less amenable to the revolutionary changes brought by DT (Toutkoushian & Paulsen, 2016). Public institutions have to use their size and their public mission to confront these difficulties and foster genuine reform.

2.4 Challenges and Drivers of DT in University Management

DT has a difficult set of challenges to overcome, and cultural resistance is often in the way. Faculty and staff who are accustomed to established routines may be skeptical or fearful of new digital systems when they perceive such systems as threatening their autonomy or job security (Brunner et al., 2023). Many employees also lack or have low digital proficiency and skills for such changes (Jensen et al, 2022). A further limitation is funding. Public institutions facing budget cuts may not have the resources to purchase the necessary hardware and software or provide training. Integrating different systems into a unified, integrated digital ecosystem does come with its own technical and organizational challenges (Morgan et al, 2021).

Still, there are a number of factors working in DT's favor, and leadership is probably the most significant. Senior leaders need to be able to articulate a compelling vision for a digital future, and secure the support and resources needed to pursue it (Westerman et al., 2014). There is also external pressure as the expectations of "digital native" students shift. They are increasingly seeking out experiences similar to that which they receive as consumers: personalized, mobile first and easy to use (Eesley et al, 2025).

There is a practical business case as well. Thus, DT can improve efficiency and allow data-driven decisions, so institutions can do more with less and show stakeholders that they are effective (Trischler & Li-Ying, 2022). The COVID-19 pandemic provided another, much larger impetus. As learning and work moved online around the world, higher education institutions had to quickly adopt online resources for teaching, learning and administration, making the pandemic a huge, unplanned catalyst for DT in the sector (Hodge et al, 2020).

This review of literature forms the theoretical basis for the present study. It raises consciousness of the importance of DT, the ways it manifests in university management and the powerful impact of institutional context. What is still needed is empirical comparative data from Iraqi higher education, where the interaction of public and private models offers a unique setting to study the phenomenon. To address this gap, this study offers a quantitative field analysis of two representative institutions.

3. METHODOLOGY

The current research is focused on investigating the digital transformation of management practices at the University of Babylon and Al-Mustaqbal Private University. The method used is a quantitative comparative case study. This approach is considered sufficient since it allows for an in-depth investigation of a current phenomenon within its real-life context and provides a foundation for comparison of two distinct contexts (Yin, 2018). The purpose of the study is to produce numerical data that can be analyzed statistically, to measure the level of DT and to see if there are any significant differences between the two institutions.

3.1 Population and Sample

The target population of the study is all the academic and administrative staff members in the University of Babylon and Al-Mustaqbal Private University, who are directly related to or affected by the management systems of the institutions. This includes academic faculty who work in these systems, department heads, and administrative staff in the registrar, admissions, finance and human resources areas.

A purposive sampling approach was employed to select participants with relevant knowledge and expertise on the management practices of the institutions and the digital transformation underway. The final sample consisted of 131 respondents. 76 valid surveys were collected from University of Babylon and 55 valid questionnaires were collected from Al-Mustaqbal Private University. The sample size is believed to be adequate for performing meaningful statistical analysis such as regression and t-tests so as to generalize the findings to the respective staff populations of the two institutions (Creswell & Creswell, 2017). The sample distribution is presented in Table 1.

3.2 Data Collection Instrument

The main instrument for data collection was a structured questionnaire filled by the respondents. It was developed after reading many research studies about DT in higher education and organizations' management (e.g., 22. Klos et al, 2021; Ross et al., 2017) The questionnaire was primarily concerned with the way in which people believed DT was deployed in several key areas of university management.

The study had two main components. It began with the gender, age, present job (such as teachers or office staff), the number of years the respondents worked at the university and the connection with the university.

The most important part was the second part of the study. It examined the extent of digital transformation achieved. The part was separated from what was already written into 4 main areas:

1. **Digital Infrastructure (DI):** The availability and reliability of hardware, software, and network systems that support management functions. (e.g., "Our university has a reliable and high-speed network infrastructure.")
2. **Process Automation (PA):** The extent to which manual administrative processes have been replaced by automated, digital workflows. (e.g., "Student registration and course enrollment processes are fully automated.")
3. **Data-Driven Decision Making (DDDM):** The use of data analytics and business intelligence tools to inform strategic and operational management decisions. (e.g., "Management regularly uses data analytics to inform strategic planning.")
4. **Digital Culture and Skills (DCS):** The extent to which the organizational culture promotes digital innovation and the level of digital literacy among staff. (e.g., "There is a strong culture of innovation and openness to new digital technologies in my department.")

All four measurements were measured twenty times, five times for each one. Respondents were asked to what extent they agreed with each statement on a 5-point Likert scale (1 Strongly Disagree, 5 Strongly Agree).

The questionnaire was piloted with 10 staff members (5 from each university) before sending to all. But these 10 people were not in the core group. The aim was to find out whether the questions were relevant, clear and understandable. Depending on what they said, some things were worded differently. Reliability of the questionnaire was checked with Cronbach's Alpha. The overall coefficient was 0.89 and each subscale (DI, PA, DDDM and DCS) had a coefficient above 0.80. The findings indicated that the data was quite consistent and reliable (Nunnally, 1978).

3.3 Data Collection Procedure

The data was collected over a period of four weeks in spring 2023. The poll was presented in two different ways to encourage more people to complete it. It was distributed at the University of Babylon personally and by a link of an internal email system, which was sent to all members of the university. At Al-Mustaqbal Private University where communication is more organized the form was mostly sent out via an official email blast and two weeks later there was a warning. An information sheet was given to all subjects, which explained the aim of the study, guaranteed privacy and secrecy and made it clear that they were under no obligation to participate. All participants gave informed consent.

3.4 Data Analysis Plan

The data were coded and entered into SPSS version 28 (Statistical Package for the Social Sciences) for analysis. The study plan aimed to answer the research questions. The statistical tests consisted of:

1. **Descriptive Statistics:** Frequencies and percentages were calculated for the demographic variables to describe the sample profile. For the main DT variables, means and standard deviations were computed to assess the overall level of DT and its sub-dimensions for each university.
2. **Independent Samples t-test:** This test was used to compare the mean scores of the University of Babylon and Al-Mustaqbal Private University on the overall DT index and on each of the four sub-dimensions (DI, PA, DDDM, DCS). The purpose was to determine

if there were any statistically significant differences between the two universities. An assumption of equality of variances was checked using Levene's Test.

3. **One-Way ANOVA:** To explore further nuances, a one-way Analysis of Variance (ANOVA) was conducted to examine if there were significant differences in the level of DT based on the respondents' years of experience (e.g., <5 years, 5-10 years, >10 years).
4. **Pearson Correlation:** A correlation matrix was generated to examine the relationships between the four DT sub-dimensions. This helped to understand how the different facets of DT (e.g., infrastructure and culture) are interrelated.
5. **Multiple Regression Analysis:** Finally, a multiple linear regression analysis was performed to determine the predictive power of the four DT sub-dimensions on a dependent variable representing "Perceived Management Efficiency." This variable was created as an average of three questionnaire items related to efficiency and effectiveness. The analysis aimed to identify which dimensions of DT are the strongest drivers of perceived efficiency.

The results of these analyses are presented in the following section, supported by seven tables that summarize the key statistical findings.

4. RESULTS AND ANALYSIS

This part presents the statistical results obtained from the analysis of the collected data using SPSS. The results are grouped in response to the research questions. They start with a description of the sample, then compare the levels of DT and lastly analyze the relation between the various aspects of DT and their impact on the perception of efficiency.

4.1 Sample Demographics

131 people were invited to take part in the study. Table 1 summarizes basic information about the group from each university. The sample includes people of different ages, positions and levels of experience. Just over half of the respondents were male (57.3%) and the largest age group was 31 to 40. The group is nearly evenly divided with teaching members (48.9%) and administrative staff (51.1%). It provides a balanced perspective of practical as well as academic management. A high percentage of respondents (41.2%) worked at their universities for more than 10 years. This means that the sample reflects the opinions of the experienced staff who have witnessed the development of management systems over time.

Table 1: Demographic Profile of the Respondents (N=131)

Variable	Category	Frequency (N)	Percentage (%)
University	University of Babylon	76	58.0
	Al-Mustaqbal Private University	55	42.0
Gender	Male	75	57.3
	Female	56	42.7
Age Group	20-30 years	28	21.4
	31-40 years	49	37.4
	41-50 years	35	26.7
	>50 years	19	14.5
Position	Faculty Member	64	48.9
	Administrative Staff	67	51.1
Years of Experience	<5 years	31	23.7

	5-10 years	46	35.1
	>10 years	54	41.2

4.2 Overall Level of Digital Transformation

The first research question was answered by descriptive statistics for the Digital Transformation (DT) index overall, which was calculated as the mean score of all 20 questionnaire items combined. The results are presented in Table 2 and give a general picture of how DT is doing at the moment as a whole group. The average number was 3.21 on a range of 1 to 5 and the standard deviation was 0.88. This score reflects that DT is used in the management methods of both institutions to a moderate extent. The number is closer to “Neutral” than “Agree”, which suggests that some digital projects are in place, but that the change is not yet complete or embedded in the company.

Table 2: Descriptive Statistics for Overall Digital Transformation

Statistic	N	Minimum	Maximum	Mean	Std. Deviation
Overall DT Score	131	1.40	4.85	3.21	0.88

4.3 Comparative Analysis of DT Dimensions

Descriptive statistics were run on all four DT sub-dimensions for both the University of Babylon and Al-Mustaqbal Private University in an effort to learn more about the two schools and to start comparing them. The results are presented in Table 3.

Table 3: Descriptive Statistics for DT Dimensions by University

DT Dimension	University	N	Mean	Std. Deviation
Digital Infrastructure (DI)	Babylon	76	3.85	0.91
	Al-Mustaqbal	55	4.12	0.78
Process Automation (PA)	Babylon	76	2.98	0.95
	Al-Mustaqbal	55	3.65	0.82
Data-Driven Decision Making (DDDM)	Babylon	76	2.71	0.89
	Al-Mustaqbal	55	3.41	0.85
Digital Culture & Skills (DCS)	Babylon	76	2.95	1.02
	Al-Mustaqbal	55	3.38	0.91

On all four dimensions shown in Table 3, the two universities are clearly and consistently different. Al-Mustaqbal Private University scored higher in all aspects. The difference is most

visible in Process Automation (PA) and Data-Driven Decision Making (DDDM) with the mean difference of 0.67 and 0.70 at the same time. This means that the private university is clearly ahead of the public university in digitizing its routine tasks and in using data for long-term planning. Smaller but still noticeable differences occur in Digital Infrastructure (DI) and Digital Culture & Skills (DCS). This means that the public university has invested some money in basic infrastructure but not enough to create a culture that welcomes digital change and teaches its staff advanced digital skills.

4.4 Testing for Significant Differences

A t-test with separate groups was used to test for statistical significance of changes in mean scores. This analysis directly addresses the second and third study questions. The results are given in Table 4.

Table 4: Independent Samples t-test Results Comparing Universities on DT Dimensions

DT Dimension	University	Mean	Std. Deviation	t-value	df	p-value (Sig.)
Overall DT	Babylon	3.12	0.91	-3.451	129	.001
	Al-Mustaqbal	3.58	0.79			
Digital Infrastructure (DI)	Babylon	3.85	0.91	-1.758	129	.081
	Al-Mustaqbal	4.12	0.78			
Process Automation (PA)	Babylon	2.98	0.95	-4.128	129	.000
	Al-Mustaqbal	3.65	0.82			
Data-Driven Decision Making (DDDM)	Babylon	2.71	0.89	-4.389	129	.000
	Al-Mustaqbal	3.41	0.85			
Digital Culture & Skills (DCS)	Babylon	2.95	1.02	-2.437	129	.016
	Al-Mustaqbal	3.38	0.91			

Note: $p < .05$ indicates a statistically significant difference.

Table 3 shows most of the changes are statistically significant as indicated by the t-tests. The average DT score for Al-Mustaqbal Private University is 3.58, which is much higher than the average score for the University of Babylon (3.12). This is reflected in a p-value of .001. That's persuasive evidence for the notion that the private university is ahead of the curve in its use of online resources to change the way it does business.

From the differences between the sub-dimensions, we can see that it is big for Process Automation (PA), Data-Driven Decision Making (DDDM) and Digital Culture & Skills (DCS) with p-values of .000, .000 and .016 respectively. This means we can be 95% confident that the

better scores at Al-Mustaqbal are not simply due to luck. The only non-statistically significant difference in Digital Infrastructure (DI) is where the p-value is .081. Al-Mustaqbal still has a higher mean but this shows that the University of Babylon has spent about the same amount of money on basic hardware and network infrastructure but it has not been as successful in converting this into automatic processes or a data-focused culture.

4.5 Analysis by Years of Experience

A one-way ANOVA was conducted to see if people's views on DT differ depending on how long they have been at university. Mean total DT scores were compared in three experience groups: <5 years, 5–10 years, and >10 years. The results summary is presented in Table 5.

Table 5: ANOVA Results for Overall DT by Years of Experience

Source of Variation	Sum of Squares	df	Mean Square	F	p-value (Sig.)
Between Groups	2.145	2	1.073	1.389	.252
Within Groups	98.765	128	0.772		
Total	100.910	130			

The F-statistic from the ANOVA test was 1.389 and the p-value was .252. This p-value is higher than the null hypothesis is false because we can't say that the .05 level of significance). This means that the respondents' years of experience did not make a statistically significant difference on how much they thought the company was changing to digital. On average, staff with less than 5 years of experience, 5-10 years of experience, and more than 10 years of experience said they were at the same level of DT maturity. The fact that different generations of staff at these universities appear to have the same view of DT suggests that it is not just a case of the views of new or experienced employees.

4.6 Interrelationships Between DT Dimensions

A Pearson correlation analysis was performed to examine the strength and direction of the linear relationships between the four DT sub-dimensions. This helps to understand how these different facets of transformation are interconnected. The correlation matrix is shown in Table 6.

Table 6: Pearson Correlation Matrix for DT Dimensions

	DI	PA	DDDM	DCS
Digital Infrastructure (DI)	1	.521**	.438**	.487**
Process Automation (PA)		1	.672**	.713**
Data-Driven Decision Making (DDDM)			1	.695**
Digital Culture & Skills (DCS)				1

** . Correlation is significant at the 0.01 level (2-tailed).

The grid shows that all relationships are positive and statistically significant at the 0.01% level. This shows that the four dimensions of DT are positively and strongly related to one another. Which is what you'd expect and good news. There is a strong correlation ($r = .521$) between Digital Infrastructure (DI) and Process Automation (PA). This means that the better infrastructure is required for more sophisticated automation. There are strong links between Process Automation (PA), Data-Driven Decision Making (DDDM) and Digital Culture & Skills (DCS). The relationship between PA and DCS is .713, whereas the relationship between DDDM and DCS is .695. Thus, universities that are good at task automation and data-driven decision making are also likely to have developed a good digital culture. These aspects are not evolving on their own, they are all working together to complete the digital transformation.

4.7 Predictors of Perceived Management Efficiency

Finally, the effect of DT on the performance of the institutions was examined through multiple regression analysis. The variable that was measured was "Perceived Management Efficiency" (PME). The four DT dimensions, i.e., DIA, PA, DDDM, and DCS were the independent factors. The goal was to see which of these four factors could best predict differences in how efficient people thought something was, and how much of those differences they could account for. The results are presented in Table 7.

Table 7: Multiple Regression Analysis for Predicting Perceived Management Efficiency

Model	Unstandardized Coefficients	Standardized Coefficients	t	p-value (Sig.)
	B	Std. Error	Beta	
(Constant)	.452	.182		2.483
Digital Infrastructure (DI)	.089	.054	.121	1.648
Process Automation (PA)	.254	.061	.328	4.164
Data-Driven Decision Making (DDDM)	.198	.058	.267	3.414
Digital Culture & Skills (DCS)	.143	.049	.224	2.918

Model Summary: $R = .782$, $R Square = .611$, $Adjusted R Square = .599$, $F = 50.12$, $p < .001$.

The regression model is statistically significant ($F = 50.12$, $p < .001$) and accounts for much of the variation in this measure. The four DT factors explain 61.1% of the variation in the efficiency perception of the sample with a R Square value of .611. This strong effect shows us that DT is really important for staff's feelings about the quality of management in their university.

Considering each predictor individually, we find that Process Automation (PA), Data-Driven Decision Making (DDDM) and Digital Culture & Skills (DCS) are statistically significant predictors of PME. The adjusted beta value for the process automation is .328 and it is the most important indicator. Thus, the most immediate and visible effect on staff perceptions of

management efficiency comes from the organization and automation of administrative tasks. Another significant factor is the ability to make data-driven decisions ($\beta = .267$) and the presence of a digital culture and skills ($r^2 = .224$). However, in this model, Digital Infrastructure (DI) is not a strong predictor ($p = .102$). It's critically important to understand that the infrastructure is required (as the links demonstrate) but it is the utilization of that infrastructure through automation, analytics and a skilled culture that directly results in observed gains in efficiency. Technology alone is not enough; it must be used well.

5. DISCUSSION

The paper explains the digital transformation in two Iraqi universities, based on empirical data. The results are analyzed and discussed in the light of the literature study, considering both the theoretical and practical aspects of the findings.

The most important conclusion is that the University of Babylon and Al-Mustaqbal Private University are significantly different in the maturity level of DT. On three of the four key dimensions, Al-Mustaqbal scored higher than the state university, namely Digital Culture & Skills (DCS), Process Automation (PA) and Data-Driven Decision Making (DDDM). This trend is in line with studies that compare and contrast the public and private sectors. References Mergel et al. (2017). Toutkoushian, & Paulsen (2016). said that public enterprises, such as public colleges, often have difficulty implementing DT because of bureaucracy, risk aversion and rigid budget processes. As per Escobar et al. (2023), the results obtained from the University of Babylon appear to suggest the same challenges. If a company has low PA and DDDM scores, it means that most decisions are made on gut feel and archaic paper-based processes rather than hard evidence. In bureaucracies, decisions are often made through well-established routes of hierarchy, and not by data-driven insights (Hinings et al., 2018).

while the study showed that Al-Mustaqbal Private University could have benefited from the factors associated with digital transformation (DT) at private universities. In a market-driven environment, private colleges have a strong motive to improve their digital efficiency and student experience to compete for students (Zabalawi et al., 2024). They may be able to buy technology and implement new systems faster, thanks to their nimbler governance and more financial flexibility (Dill, 2016). The very high Digital Culture & Skills score is especially remarkable. Brunner et al. (2023) pointed out the significance of staff upskilling as a key success factor and suggested that Al-Mustaqbal could have managed the "soft" side of change more successfully by establishing and investing in a culture of innovation.

It is interesting that there was no statistically significant difference in Digital Infrastructure (DI) and this deserves further investigation. It could mean that the University of Babylon or the Iraqi government has spent a lot of money on networking and basic IT gear, perhaps as part of a countrywide effort to rebuild. If this is the case, then the public university does not have a problem of inefficient use of basic technology. The regression analysis revealed the application-oriented dimensions but not DI as a substantial predictor of perceived management efficiency. Considering this we can see that digital transformation is something different than digitization. Digital instruments are easily accessible, but transforming a company to maximize its potential is a different ballgame (Vial, 2021). Perhaps the University of Babylon has successfully digitized but not yet successfully transitioned to transformation.

As shown in Table 6, all the DT dimensions are strongly positively correlated, which supports the idea that DT is best conceptualized as a whole rather than a set of independent variables. So it is unlikely that a patchwork approach will work. Investments in data analysis tools will not yield any meaningful results without DDDM-related factors like process automation to generate clean data (PA) and a data-trusting and -using culture (DCS). Thus, DT management is complex and requires a coordinated approach addressing technology, procedures, people and culture in parallel (Ross et al., 2017).

Table 7 presents the regression analysis of the components of perceived efficiency. One of the most telling indicators of the practical, day-to-day impacts of computerizing mundane administrative tasks is process automation (PA). Staff who handle student records, financial requests or human resources issues say the biggest advantages of DT are less paperwork, shorter wait times and fewer manual errors. This result should be of particular interest to university administrators, since it suggests that automating key administrative functions can have an immediate positive impact on morale and productivity.

Interestingly, the ANOVA test by years of experience did not yield a significant result (Table 5). This finding supports the notion that the success and failure of DT are equally felt by all employees, regardless of their tenure at the firm. It could be interpreted in two ways. Or perhaps the influence an organization's culture has on people is very similar in all organizations. Or the DT efforts that have been made so far might be fundamental, impacting all workers equally rather than offering advanced, role-specific improvements that employees would experience differently.

The data suggest a clear difference between the two institutions considered together. The competition pressure and the organizational flexibility at Al-Mustaqbal Private University have resulted in the digital technology to go beyond the basic infrastructure and enter the heart of management and a more agile corporate culture. The result has been improved automation, more data-informed decisions and improved perceived managerial efficiency. The University of Babylon has a similar infrastructure but has been hampered by public sector inertia in its capacity to turn those technical resources into reforms in procedure and culture. The DT journey is still at its beginning, with the focus on digitalization and not a complete transformation of the organization.

6. CONCLUSION AND RECOMMENDATIONS

The study aimed at investigating and comparing the digital transformation of management systems in the University of Babylon, a public university, and Al-Mustaqbal Private University in Iraq. The study's key findings are based on a quantitative analysis of data from 131 staff members. First, there is a statistically significant difference between the two institutions in the extent of application of DT, where the private university (Al-Mustaqbal University) is in a more advanced and mature stage of transformation. Second, this difference is more evident in data-driven process automation and decision-making than in the core digital infrastructure. Third, the aspects of DT are inseparable. It is the use of technology through automation and analytics that immediately translates into perceived improvements in managerial efficiency, supported by a facilitating culture.

These findings have serious implications for the institutions studied and for the larger Iraqi higher education industry. With these data, we provide the following personalized recommendations.

Recommendations for the University of Babylon:

1. **Establish a Dedicated DT Office:** To overcome bureaucratic inertia, the university should create a central office with a clear mandate, authority, and budget to drive the DT agenda. This office should be led by a Chief Digital Officer reporting directly to the university president to ensure top-level support (Westerman et al., 2014).
2. **Focus on Process Re-engineering Before Automation:** The primary focus should shift from simply digitizing existing manual processes to fundamentally re-engineering them for a digital environment. This requires mapping out current workflows, identifying inefficiencies, and designing new, streamlined processes before implementing technology (Ross et al., 2017).
3. **Invest in Data Literacy and Analytics:** The university must launch a comprehensive program to build data analytics capabilities. This includes investing in BI tools, but more importantly, providing training for managers and staff on how to interpret data and use it for decision-making, thereby strengthening the DDDM dimension (Trischler & Li-Ying, 2022).
4. **Champion a Change Management Program:** To address the lag in Digital Culture & Skills, a structured change management program is essential. This should involve communicating a clear vision for the digital future, celebrating small wins, providing robust training and support, and actively addressing staff resistance to change (Brunner et al., 2023).

Recommendations for Al-Mustaqbal Private University:

1. **Deepen Data Integration and Governance:** While strong in DDDM, the university should now focus on creating a more integrated data ecosystem. This involves establishing a formal data governance framework to ensure data quality, security, and consistency across all systems, moving beyond siloed departmental analytics (Morgan et al., 2021).
2. **Enhance Cybersecurity Measures:** As a highly digitalized institution, Al-Mustaqbal is a more attractive target for cyberattacks. It must proactively invest in advanced cybersecurity infrastructure and policies to protect sensitive student and institutional data.
3. **Foster Continuous Innovation:** To maintain its competitive edge, the university should move beyond established DT practices and foster a culture of continuous innovation. This could involve establishing a "digital innovation lab" to experiment with emerging technologies like AI in student services or blockchain for credentialing (Li, 2020).
4. **Measure and Communicate ROI:** To justify ongoing investment, the university should develop a robust framework for measuring the return on investment (ROI) of its DT initiatives, not just in terms of efficiency but also student satisfaction and institutional reputation.

Recommendations for Future Research:

This research is insightful but has its flaws. A single cross-sectional study. The main suggestion for future research is a longitudinal study of DT in these and other Iraqi institutions. This investigation may shed light on the dynamics of change and long-term effects of DT treatments. Two, the study was a quantitative one. Qualitative research, through a mixed-methods approach of interviews and case study analysis, can better understand the socio-technical factors,

cultural nuances and political dynamics behind quantitative findings. Finally, more public and private colleges in Iraq could be included to enable more generalizations and national best practices.

Finally, digital transformation is a continuous process. Iraqi universities have unique problems, but also great opportunity in this path. This research has shown the differing ways of doing business in a public and a private university and offers a data-driven roadmap that could guide these and similar institutions to navigate the digital age and fulfill their vital role in society.

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