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Digital drivers of digital transformation in public sector organizations

Mohammad Faleh Hunitie[a*] and Abdel Hakim Akhorshaideh[a]

[a]*Department of public Administration, Faculty of Business, University of Jordan, Jordan*

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A B S T R A C T

This study aimed to investigate digital drivers of digital transformation success in public sector organizations. Based on prior related studies, three digital drivers were selected as key drivers, which are digital government, digital leadership, and digital HRM. Gathering data by online questionnaires from public sector employees, the study based on SmartPLS 3.0 statistics found significant and positive impacts of these three drivers on digital transformation success. Interestingly, the results refer to the success of digital transformation is greatly subject to digital HRM and possibly this effect is due to the fact that the basic aim of digital government and digital leadership is to enhance the operations of the digitization process through adopting digital-oriented public administration mentality, creating public value, setting shared digital vision and strategy, communicating digital change goals, initiating digital organizational culture, which is basically guided and can be attained through efficient and effective digital HRM practices. Hence, the study contributes to the literature through underlying three digital drivers of digital transformation success. It calls scholars for considering these drivers when examining success factors of digital transformation and practitioners when redesigning organizations to adapt digital change.

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1. Introduction

Digital transformation gained great attention from practitioners and scholars. According to Mergel et al. (2019), practitioners spare no effort through digital innovations to redesign organizations to change the way they work, and scholars seek to recognize how and why these creativities succeed or go unsuccessful. It has been acknowledged that digital transformation assists organizations to maximize their organizational performance, deliver high quality products and services, reduce costs, increase processes efficiency (Barišić et al., 2021). For public sector, digital transformation represents a milestone in public sector reform which include decreased public expenditure, improved quality of public services, effective government operations, and more operative policies (Lindgren & van Veenstra, 2018) as well as enhancing the achievement of the suitable development goals (ElMassah & Mohieldin, 2020). From the United Nations perspective, digital government represents a tool for figuring out operative and responsible institutions to support public delivery and policy making for the sustainable development goals (Liva et al., 2020). Research on digital transformation in Jordan and other countries covers numerous aspects such as success factors of digital transformation (Melitski et al., 2011; Promsri, 2019; Virkar et a1., 2019; Zhang et al., 2022; Pittaway & Montazemi, 2020; Morakanyane et al., 2020; Palma et al., 2023), economic development in knowledge sectors (Adaileh & Alshawawreh, 2021), competitive advantage (Shehadeh et al., 2023), digital human resource management systems (Bannikov & Abzeldinova, 2021; Barišić et al., 2021; Gadzali et al., 2023; Mansour et al., 2024), digital entrepreneurship (Abaddi & AL-Shboul, 2024), digital government transformation (Liva et al., 2020; Huang & Karduck, 2017; Lindgren & van Veenstra, 2018; Viana,

* Corresponding author.
E-mail address mohammad@ju.edu.jo (M. F. Hunitie)

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2021), digital leadership (Yücebalkan et al., 2018; Hensellek, 2020; Klein, 2020; Li, 2020; Schiuma et al., 2022), electronic payment systems for public services (Lin et al., 2023), electronic government (Al-Refaie & Ramadna, 2021; Dmour, 2021), strategic agility (Alzuod et al., 2023), electronic humane resource management (Mansour et al., 2024), electronic wallets (Hammouri et al., 2023), industry 4.0 (Al-Zyadat et al., 2022; Galanti et al., 2023). However, many previous works on digital transformation impacts were conducted using qualitative methods either by literature review or interviews (e.g., Levkovskyi et al., 2020; Liva et al., 2020; Barišić et al., 2021) and therefore little empirical studies were carried out to underline digital transformation success in organizations of public sector. Hence, this study aimed at narrowing such a literature gap by investigating digital drivers of digital transformation success in public organizations.

2. Literature review

2.1 Digital transformation

Digital transformation refers to integrating technology in business operations and service delivery as it represents a move from traditional to creative procedures in improving products or services (Afaishat et al., 2022). Such a term is related to industry 4.0 technologies such as social media, big data, cloud computing, and artificial intelligence (Klein, 2020), which enable key transactions improvement (Barišić et al., 2021) along with initiating strategic operational changes through digital innovations (Li, 2020). Digital transformation in the public sector is more than electronic solutions as it requires shifting government processes, introducing flexible human resource policies and overcoming cultural obstacles and agile leadership (Virkar et a1., 2019). It covers public service delivery and public value creation through emphasizing its impacts on economic and societal aspects of digitization (transforming analogue to digital information) and digitalization (using digital technologies to transform work operations), which means that digital transformation signifies the way in which work practices are changed (Nachit et al., 2021). In the public sector the aim of the digital transformation is to add value to citizens through adopting digital technologies as well as enabling decision makers to deliver good decisions (Huang & Karduck, 2017) in order to maximize citizen gains through receiving high-quality services (Palma et al., 2023).

Factors that contribute to digital transformation success as cited in the literature encompass individual (e.g., digital talent employees and motivated employees), organizational (e.g., adequate budget, effective communication, effective performance management, and management support), and strategic factors (e.g., citizen involvement, and goal clarity) (Melitski et al., 2011), digital strategy, organizational strategy, and information technology governance (Pittaway & Montazemi, 2020), digital drivers (e.g., digital skills and technologies, and digital leadership traits), digital vision (e.g., digital strategy, digital future, and digital present awareness), digital culture (e.g., collective intellectualization of digital leadership traits, and good governance practices), digital organization (e.g., digital innovative structure), as well as opportunities of transformation areas (Morakanyane et al., 2020), digitalized human resource practices (Nicolás-Agustín et al., 2022), digital leadership (Yücebalkan et al., 2018; Promsri, 2019; Klein, 2020). Hence, digital transformation success can be assessed based on indicators like organizations high quality services, reduced public expenditure, effective government operations, adequate digital infrastructure, adequate characteristics of digital leadership and use of digital technologies to manage human resource practices (Lindgren & van Veenstra, 2018; Promsri, 2019; Morakanyane et al., 2020; Klein, 2020; Viana, 2021; Bannikov & Abzeldinova, 2021; Barišić et al., 2021).

2.2 Digital drivers of digital transformation success

2.2.1 Digital government

Digital government concerns using information technology to enhance government operations through digitalization of government services (Lindgren & van Veenstra, 2018) to create public value (Viana, 2021). Liva et al. (2020) defined digital government as A process of transitioning from traditional government to the prime forms of electronic government., i.e., e-government 1.0 as one-way government-oriented operations, e-government 2.0 as a citizen-oriented operations based on web 2.0 technology, e-government 3.0 as a process of smart government services and decisions, and e-government 4.0 as a process of using real-time public services and advanced analytics. Citing OECD's nine pillars for digital government, Viana (2021) indicates that public organizations are requested to pay attention to several aspects such as leadership, regulatory framework, organizational culture, integrated methods, and encouraging systems thinking to service delivery and policymaking, strategic data management, adequate digital infrastructure. Therefore, digital government, as a key driver of transforming public administration leads to creating public value (Lindgren & van Veenstra, 2018), was expected to be a significant pillar of digital transformation success as stated in the following hypothesis:

H_1: *Digital government has a positive effect on the perceived success of digital transformation.*

2.2.2 Digital leadership

Digital leadership has been regarded as a crucial factor for digital transformation success (Klein, 2020; Afaishat et al., 2022). According to Promsri (2019), digital leaders' characteristics for digital transformation success are related to digital knowledge, digital vision, leadership agility, customer focus, collaboration, and risk-taking. Carrying out a content analysis on leadership characteristics in the digit era, Klein (2020) classified characteristics of digital leaders into three categories: characteristics of digital business (e.g., innovative visionary, network intelligence, and digital intelligence), characteristics of social leadership attitude (e.g., leader as a role model, a motivation coach,

and social intelligence), and general mindset characteristics (e.g., leader adaptability, agility, and life-long learning). Hensellek (2020) regarded digital leadership as a twofold capability consisting of digital mentality, i.e., leader' attitude toward digital technologies and their uses, and digital skillset, i.e., skills required for understanding these digital technologies and recognizing their related opportunities. Thus, digital leadership is projected to boost digital transformation success in organizations of public sector as specified in the following hypothesis:

H_2: *Digital leadership has a positive effect on the perceived success of digital transformation.*

2.2.3 Digital HRM

It was recognized that successfully implementing digital transformation supports organizations to be able to reduce cost, maximize performance, plan flexible production, execute effective processes, provide high quality products and services, and high responsiveness (Barišić et al., 2021). These objectives can be attained through HRM practices (Barišić et al., 2021; Gadzali et al., 2023). Scholars who study HRM practices in the digital era lay emphasis on numerous human resource practices such as planning, performance management, reward management, talent management, health and safety, training and development, employee effective communication, employee relations, and employee engagement, (Barišić et al., 2021; Gadzali et al., 2023; Al-Ayed & Al-Tit, 2024). Some of these authors (e.g., Barišić et al., 2021) indicate that the effect of digital transformation on human resource management can be seen through human resource information systems. For Gadzali et al. (2023), HRM practices help organizations overcome the challenges of digital transformation as training and development enhances employee digital skills, talent management enables organizations to recruit, attract and retain digital talent employees, and effective communications allow clear understanding of organizational change. Generally, employee digital skills significantly support digital transformation success (Zhang et al., 2022). Consequently, it was anticipated that digital HRM practices apply significant impacts on digital transformation success in organizations of public sector as summarized in the following hypothesis:

H_3: *Digital HRM has a positive effect on the perceived success of digital transformation.*

3. Methodology

3.1 Data collection

A convenience sample consisting of 350 public employees was selected for the purpose of this research to collect research data through an online questionnaire. Prior to original data collection, a pilot sample consisting of 30 public employees was employed to carry out a pilot study for questionnaire validity and reliability checks. A total of 233 valid questionnaires were returned and utilized in data analysis with a response rate of 66.5% due to exclusion of 117 responses as outliers.

3.2 Research measures

The independent variable (digital drivers of digital transformation), in Table 1, was conceptualized as an exogenous construct involves three dimensions, i.e., digital government, digital leadership, and digital HRM, and the dependent one (digital transformation success) was operationalized as an endogenous whole construct.

Table 1
Research questionnaire

Variable	Codes	Items	References
DG	DG1	Using real-time public services.	Huang & Karduck (2017); Lindgren & van Veenstra (2018); Virkar et a1. (2019); Viana (2021); Liva et al. (2020).
	DG2	Improving government internal efficacy.	
	DG3	Digital-oriented public administration mentality,	
	DG4	Creating public value through digitalization of public services.	
	DG5	Supporting decision-making processes.	
DL	DL1	Having shared innovative digital vision and strategy.	Promsri (2019); Mohieldin (2020); Pittaway & Montazemi (2020); Schiuma et al. (2022); ElMassah & Hensellek (2020).
	DL2	Possessing necessary digital knowledge and skills.	
	DL3	Energizing employees to embrace digital-oriented change.	
	DL4	Investing in digital human capital.	
	DL5	Initiating and communicating digital culture.	
DHRM	DHR1	Receiving adequate training to enhance employee digital skills.	Barišić et al. (2021); Galanti et al. (2023); Bannikov & Abzeldinova (2021); Gadzali et al. (2023).
	DHR2	Using digital solutions to assess training needs and IT skills.	
	DHR3	Attracting, recruiting, and retaining digital talent employees.	
	DHR4	Communicating clear understanding of digital-oriented change.	
	DHR5	Increasing personnel management efficiency	
DTS	DTS1	DT helps organizations deliver high quality digital services.	Lindgren & van Veenstra (2018); Morakanyane et al. (2020); Klein (2020); Viana (2021); Barišić et al. (2021);
	DTS2	DT enables organizations reduce public expenditure.	
	DTS3	DT boosts effective government operations.	
	DTS4	DT triggers digital collaboration between stakeholders.	
	DTS5	DT enhances efficient policymaking process.	

The independent variable was measured by 15 items: digital government (DG1-DG5), digital leadership (DL2-DL5), and digital HRM (DHR1-DHR5). On the other side, the dependent variable was measured by 5 items (DTS1-DTS5). Totally, the digital drivers of digital transformation can be assessed by these 15 items (DG1-DHR5). All these items were adapted from previous related works (Melitski et al., 2011; Huang & Karduck, 2017; Virkar et a1., 2019; Lindgren & van Veenstra, 2018Promsri, 2019; Liva et al., 2020; Pittaway & Montazemi, 2020; ElMassah & Mohieldin, 2020; Morakanyane et al., 2020; Hensellek, 2020; Klein, 2020; Barišić et al., 2021; Bannikov & Abzeldinova, 2021; Viana, 2021; Schiuma et al., 2022; Gadzali et al., 2023; Galanti et al., 2023). The instrument is based on a Likert scale that ranges from one-point (strongly disagree) to five-point (strongly agree).

3.3 Theoretical model

Based on previous studies on digital transformation, the theoretical model for this research was developed. as shown in Fig. 1 shows three hypothesized relationships between digital government, digital leadership, and digital HRM as independent variables and digital transformation success as a dependent variable.

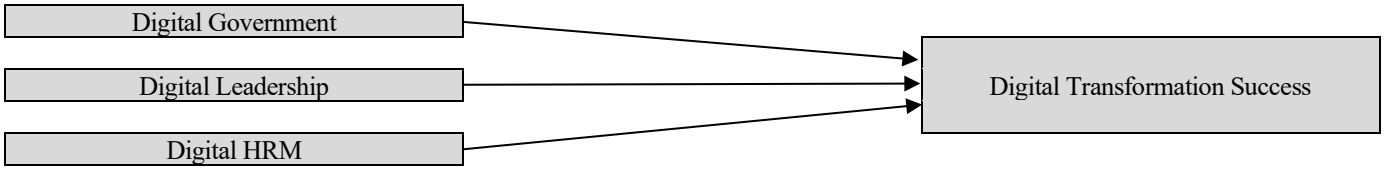

Fig. 1. Research theoretical model

4. Data analysis

4.1 Validity and reliability

Four indicators were used to assess validity and reliability, i.e., factor loadings (FL) and the average extracted variance (AVE) to test validity as well as Cronbach's alpha coefficient (α) and Composite reliability (CR) to estimate reliability. Values of AVE and factor loadings should be above 0.50 (Hair et al., 2006) and values of CR and alpha (α) should be above 0.70 (Al-Ayed & Al-Tit, 2024; Hair et al., 2011, 2017). In Table 2 revealed that validity and reliability indicators were accepted, i.e., digital government (FL: 0.709-0.948, AVE: 0.782, CR: 0.947, α: 0.927), digital leadership (FL: 0.713-0.759, AVE: 0.546, CR: 0.858, α: 0.793), digital HRM (FL: 0.816-0.887, AVE: 0.727, CR: 0.930, α: 0.906), and digital transformation success (FL: 0.780-0.858, AVE: 0.685, CR: 0.916, α: 0.885).

4.2 Model fit

Three indicators were used to assess model fit: The Standardized Root Mean Square Residual (SRMR) with a cut-off value less than 0.1, the normed fit index (NFI) with a cut-off value higher than 0.80 as well as the determination coefficient (R^2) with three values: weak ($R^2 = 0.25$), moderate ($R^2 = 0.50$), and strong ($R^2 = 0.75$). The results as shown in Table 2 indicate acceptable values of these indicators (SRMR: 0.067, NFI: 0.805) and the explaining power of the independent variables is moderate to strong (R^2: 0.71). Based on these results, the current model is accepted and can be used to test research hypotheses.

Table 2
Results of validity, reliability and model fit.

Variable	Codes	Descriptive stat.		Validity		Reliability		Model fit	
		Mean	SD	FL	AVE	CR	α	SRMR	NFI
DG	DG1	3.54	0.71	0.915	0.782	0.947	0.927	0.067	0.805
	DG2	3.52	0.69	0.935					
	DG3	3.55	0.70	0.948					
	DG4	3.51	0.69	0.709					
	DG5	3.55	0.69	0.893					
DL	DL1	3.36	0.66	0.713	0.546	0.858	0.793		
	DL2	3.27	0.66	0.743					
	DL3	3.23	0.69	0.759					
	DL4	3.34	0.68	0.738					
	DL5	3.39	0.69	0.742					
DHRM	DHR1	3.63	0.74	0.816	0.727	0.930	0.906		
	DHR2	3.67	0.77	0.864					
	DHR3	3.68	0.76	0.887					
	DHR4	3.71	0.73	0.862					
	DHR5	3.66	0.76	0.832					
DTS	DTS1	3.72	0.77	0.813	0.685	0.916	0.885		
	DTS2	3.71	0.76	0.843					
	DTS3	3.71	0.72	0.844					
	DTS4	3.68	0.78	0.858					
	DTS5	3.67	0.75	0.780					

4.3 Hypotheses testing

Research hypotheses were tested using SmartPLS 3.0 software as shown in Table 3 and Figure 2. These results indicate that the three proposed hypotheses were supported.

Table 3
Hypotheses testing

	Research hypotheses			β	t-value	p-value
H1	DG	→	DTS	0.119	3.036	0.002
H2	DL	→	DTS	0.173	4.175	0.000
H3	DHRM	→	DTS	0.676	18.307	0.000

That is, there is a significant positive impact of digital government (DG) on digital transformation success (β = 0.119, t-value = 3.069, p-value = 0.002), a significant positive impact of digital leadership (DL) on digital transformation success (β = 0.173, t-value = 4.175, p-value = 0.000), and a significant positive effect of digital HRM (DHRM) on digital transformation success (β = 0.676, t-value = 18.307, p-value = 0.000). It was noted that digital HRM showed the highest effect on digital transformation success, followed by digital leadership, then digital government. Totally, all these independent variables have a strong explaining power of the variance in digital transformation success (R^2: 0.724).

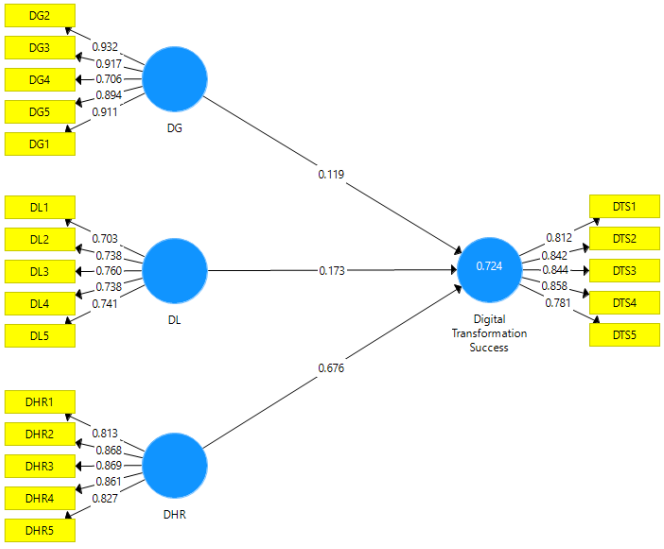

Fig. 2. Research final model

5. Results, discussion and conclusion

Investigating some digital factors of digital transformation success in organizations of the public sector results in significant effects of digital leadership, digital government and digital HRM on digital transformation success. In fact, these three digital drivers meet the requirements of digital transformation success. Firstly, digital government as a process of creating public value (Lindgren & van Veenstra, 2018) through improving government internal efficacy, delivering real-time electronic services, and supporting decision-making processes (Huang & Karduck, 2017; Virkar et a1., 2019; Lindgren & van Veenstra, 2018; Viana, 2021; Liva et al., 2020) contribute to enabling public organizations to carry out effective operations, produce high quality digital services, reduce their expenditures, achieve digital operative collaboration with their stakeholders, and enhance policy making process, which means that digital government significantly contributes to digital transformation success.

Secondly, digital leadership as a set of leadership traits related to digital vision, citizen-centric focus, leadership agility, digital intelligence, risk-taking, collaboration, adaptability, agility, and life-long learning, employee motivation to embrace digital changes, initiating organizational digital culture, and developing digital human capital (Promsri, 2019; Mohieldin, 2020; Pittaway & Montazemi, 2020; Schiuma et al., 2022; ElMassah & Hensellek, 2020; Klein, 2020) assist public organizations operate effectively to provide digital e-services, collaborate digitally with partners, produce cost-efficient decisions and good formulated policies. In other words, digital leadership adds a significant value for digital transformation success. Thirdly, digital HRM as an established group of human resource-oriented practices support organizations to build adequate human capital resources through human resource planning, digital training and development, reward management, performance management, communicating digital change prerequisites (Barišić et al., 2021; Galanti et al., 2023; Bannikov & Abzeldinova, 2021; Gadzali et al., 2023; Al-Ayed & Al-Tit, 2024), which in turn support digital transformation success (Zhang et al., 2022).

However, the study pointed out that digital HRM is the most influential factor of digital transformation success. Possibly, this substantial effect is due to the fact that the basic aim of digital government and digital leadership is to enhance the operations of the digitization process through adopting digital-oriented public administration mentality, creating public value, setting shared digital vision and strategy, communicating digital change goals, initiating digital organizational culture, which is basically guided and can be achieved through efficient and effective digital HRM practices. According to these results, it was concluded that the digital transformation success in organizations of the public sector is subject to digitalization of government operations to create public value through real-timed public services, leadership digital vision, strategy and traits, which are channeled over and done with digitally enriched human resource management practices.

6. Research implications, limitations, and future research

Based on the results, this paper contributes to the literature review of digital transformation success through underlining three digital factors of digital transformation success in public organizations, which are digital government, digital leadership, and digital HRM practices. Such a contribution signifies that the digital transformation process is greatly dependent on digital antecedents related to government mentality and operations, transformational leadership traits in the digital era, and digital practices of HRM. Empirically, the study initiates a significant link between digital transformation success and its prerequisites by which policy makers can bridge digital changes in several related domains such as government operations, digital vision and strategy, and management of digital human resource practices. However, this study is limited to its cross-sectional design, sample size, validity and reliability of the questionnaire as well as to the current digital drivers of digital transformation success. Therefore, further research is required to conduct longitudinal research on digital transformation in public organizations using larger sample size to investigate the effect of the present digital drivers and explore more drivers influencing the digital transformation success in organizations of public sector.

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