IT Alignment: A Management Paradigm for Digital Transformation in Public Organisations

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Abstract

Researchers and practitioners agree that a broad spectrum of changes must be managed to realise the benefits of digital transformation. To this end, the role of IT alignment—the fit between IT, overall organisational goal, and organisational configuration—is acknowledged. At the same time, few empirical studies investigated the relationship between IT alignment and digital transformation, particularly in the public sector. Given the inherent differences between organisations in the private and public sectors concerning the application of emerging technologies, an exploratory study was conducted to further our understanding. The primary data collected through interviews and internal-organisational documents suggest that IT alignment improves the likelihood of successful digital transformation in a public organisation. The analysis also revealed organisational and managerial factors that determine the degree of IT alignment, which were used to develop a theoretical model. The model was tested with quantitative data collected through an online survey collected from 421 respondents. The preliminary results and contributions of the study are presented.

Keywords

Digital transformation, IT alignment, public organisations, public value theory, stakeholder theory, technology enactment theory

1. Introduction

The dynamic business environment and the emergence of digital technologies have presented myriads of opportunities for today's organisations. However, these opportunities have also required a paradigmatic shift in management with new and appropriate strategic responses [1, 2, 3]. Unsurprisingly, we notice shorter product life cycles, highly customised or differentiated products, value-added services, and synchronised product-service combinations due to the emergence of new technologies and innovative business models. Leaders across sectors and industries attribute this development to digital transformation. This phenomenon has also surfaced in the academic literature within the area of strategic IS research [4, 5]. Digital transformation refers to "*the IT-enabled change in organisations through the digitalisation of products, services, core processes, customer touchpoints and business models*" [6, p. 3]. Opinion

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pieces and reports from practitioner outlets also acknowledge digital transformation as a timely issue related to strategic decisions to further the goals of today's organisations [7, 8].

Despite the phenomenon's popularity among practitioners and researchers, articulating what digital transformation entails and how to manage it to fruition proved challenging. Researchers argue that digital transformation remains to be a protean concept [3, 9]. One reason for this confusion might be the common assumption that digital transformation has been considered merely a technological phenomenon [10]. Recently, though, there seems to be a growing consensus among scholars that digital transformation is a multifaceted phenomenon that needs to be explored further. For instance, [11] argues that technology is just one piece of the complex digital transformation puzzle that must be solved for organisations to achieve their overall objective and remain competitive in the new digital world. To this end, the work towards a successful digital transformation should incorporate an appropriate strategy formulation [4, 12] and changes to an organisation [13, 14]. However, the digital transformation initiatives undertaken by many organisations have made it necessary to rethink our view of the traditional rules of strategy [15]. Gobble [16] also argues that only organisations that view digital transformation as a journey can formulate a robust strategy that supports a well-articulated road map for successful transformation. The road map should outline the necessary changes, including organisational structure [17], business processes [18], and organisational culture [19].

As the extant literature suggests, digital transformation initiatives can be fruitful in enabling value creation when the various organisational changes are on par with the introduction of new technologies [2, 20, 21] as well as the fit between the IT- and overall organisational business strategies [13, 22, 23]. This is what scholars refer to as IT alignment, a related phenomenon that has remained popular among researchers and practitioners for decades in a row [24, 25, 26]. According to recent studies, IT alignment, which refers to the "*application of information technology in an appropriate and timely way, in harmony with business strategies, goals and needs*" [27, p. 69], is one of the determinants of digital transformation success [2, 3, 28]. Given this critical role of alignment during the digitalisation era, there are calls for further studies investigating the relationship between IT alignment and digital transformation (e.g., [24, 29, 30, 31, 32]). This explains the rise in the number of studies exploring this relationship [33, 34]. However, a closer look reveals that public organisations were not adequately represented. This is true for both IT alignment and digital transformation research [14, 23, 35, 36]. There is a rationale for this lack of knowledge to be addressed. Researchers argue that IT alignment is found to be more challenging in such highly pluralistic organisational settings as organisations in the public sector [26, 37, 38]. The justification for this assertion is founded on IS and organisational studies literature. Public organisations were found to be complex given the presence of multiple stakeholders with varying interests as well as arrangements with inherent administrative and political tensions [39]. This complexity, in turn, has implications on how organisations view digital transformation and formulate their IT- and organisational strategies reflecting the interests of the diverse stakeholders [14, 26, 38]. The findings of recent case studies (e.g., [40, 41]) also suggest that the introduction of digital technologies to solve complex public administrative tasks has raised many unanswered questions. Thus, this study aims to address the gap in the literature and investigate IT alignment and its role in digital transformation in public organisations. The following two research questions are formulated.

RQ1: *What is the role of IT alignment for digital transformation in a public organisation?*
RQ2: *How can public organisations improve IT alignment to enable successful digital transformation?*

The remainder of the paper is organised as follows. First, a brief overview of related studies on digital transformation and strategic alignment is presented. Next, the research methodology discusses the research strategy adopted along with the data collection and analysis methods. The subsequent section presents the preliminary results of the study. Finally, the contribution of the study for research and practice is briefly presented.

2. Related Studies

2.1. Managing Digital Transformation in Public Organisations

Scholars argue that the reasons for digital transformation in many public organisations seem to mimic that of the private sector. More recently, however, the motivation for digital transformation in the public sector reflects the current view in public management approaches [42, 43]. For instance, the original work of Moore [44] on public value theory is popular among researchers investigating digital transformation. Even though the theory is not specific to the digital transformation phenomenon or the use of digital technologies, researchers argue that it informs us of the organisational context of the public sector. The theory is the basis of articulating the primary rationale for digital transformation, i.e., creating public value by utilising emerging technologies and launching digital government initiatives. This contrasts with the New Public Management (NPM) narratives where digital transformation initiatives in public organisations are expected to result in economic benefits [45]. In other words, prior studies in information systems and public administration research domain view information technology as a tool to improve administrative efficiency [43]. Given the unfortunate lack of success of the NPM, it is reasonable to aim for public value creation when the public sector embarks on the complex transformation journey [42, 43].

Another set of related studies which have significance for digital transformation in the public sector is the recognition of organisational context and its role in how technology is used. A closer look into prior studies indicates criticism for views that do not acknowledge the realities of public organisations. For instance, the technological determinism views (e.g., [46]) do not appreciate the significance of various organisational factors for digital transformation. According to [47], the provision of public services that can satisfy citizens' needs can only be achieved when the public sector is transformed. The authors argue that this transformation involves redesigning the internal processes and making continuous adjustments to the relationship between organisations and various stakeholders. However, the specific organisational setting of public organisations determines how new digital technologies can be used to meet the organisational objectives. This is consistent with Fountain's [48] technology enactment theory stating various organisational contexts determine the way specific meanings are assigned to technologies. Thus, it is in the best interest of organisations to facilitate the appropriate use of digital technologies recognising the particular conditions of an organisation where technology use is being introduced.

2.2. IT Alignment in the Public Sector

IT alignment continues to be one of the most researched areas in the IS and cognate disciplines. Given its important role in digital transformation undertaken in many organisations, the significance of IT alignment is more important than ever. Thus, consistent with [49], we argue that studies still need to be carried out to further our understanding of the phenomenon. Important areas of study include—(1) exploring antecedents, (2) designing an assessment of alignment maturity models, and (3) establishing the various dimensions. Besides, researchers argue that IT alignment studies recognising the contextual differences between organisations in various sectors and industries are necessary. For instance, prior studies focused on investigating IT alignment in the airline industry [50], manufacturing firms ([51], financial services [52], small and medium enterprises [53], and large organisations [54, 55]. On the other hand, the dearth of IT alignment studies within the context of public organisations is acknowledged [38, 56, 57, 58]. This is a paradoxical shortcoming in the extant literature, given the inherent contextual differences between public and private organisations.

According to [14, 38], public organisations present a specific context to study the application and management of information technology use. Among others, two significant differences between public and private organisations are often cited as a rationale for exploring IT alignment in the public sector context. First, public organisations use non-financial metrics to measure the value of IT investments. This is consistent with the public value theory, where leaders are expected to have the creation of added value in mind as they configure resources. Second, public organisations are expected to meet social, economic and political objectives that meet the interest of many. Thus, it is complex to demonstrate the value derived from integration of IT missions, objectives and plans into various aspects of administration functions. This is reflected in the complex decision-making structures where political and administrative powers are exercised, and formal bureaucratic structures and red tapes are put in place [56, 58].

On the other hand, we argue that IT alignment studies (i.e., within the context of public organisation) need to be conducted, recognising the new developments in the technological landscape and the evolution of the construct's conceptualisation. For instance, a review of studies between 2000 and 2018 [22] indicates that the evolution of IT alignment as a construct has implications on how it is perceived and pursued. For instance, researchers initially viewed IT alignment as a static position primarily concerned with strategic "*fit*" between IT and business strategies. However, the emergence of appreciation for structural, cultural and social elements of IT alignment in recent studies revealed a change in our understanding of the phenomenon [22]. Relying primarily on contingency theories, we have also seen an emergence of studies recognising the significance of contextual factors for IT alignment. In this regard, the issues of the dynamic business environment, organisational agility and complex organisational structures have been brought into the IT alignment research mix (See [24, 34, 49]). According to [22], the changes in conceptualisation have resulted in a new way of enquiry towards IT alignment recognising the need for further exploratory studies.

2.3. IT Alignment as a Prerequisite for Digital Transformation

Researchers argue that organisations that fail in their digital transformation initiatives also default in their attempts to reach and maintain IT alignment. For instance, a review of prior studies (e.g., [22, 24, 34]) reveal that it is in organisations' best interest to maintain an IT-aligned position to capitalise on opportunities of digital transformation. The extant literature also suggests that IT alignment is an essential prerequisite for a successful digital transformation [32]. As depicted in **Figure. 1**, research suggests that managing the strategic, structural and social aspects of IT alignment results in a successful digital transformation with favourable outcomes —improved operational efficiency, enabling value creation, and improved partnership management [34].

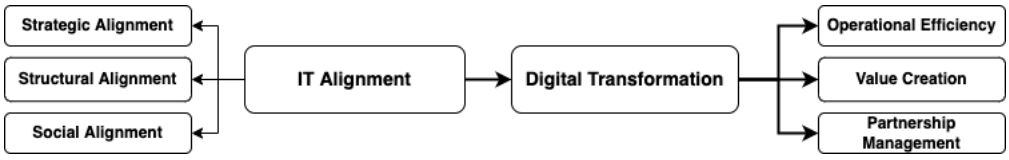

Figure 1: The relationship between IT alignmnet and Digital Transformation (own construction).

Even though the vital role of IT alignment for digital transformation is already established in the literature [32], few empirical studies are explored this relationship within the context of public organisations [35, 38]. As discussed above, IS studies suggest that IT alignment and digital transformation seem more challenging in organisations in the public sector [41, 40, 56, 58]. Besides, the current dynamic IT and market landscape make IT alignment a timely but a challenging issue for leaders [24, 34]. On the other hand, there is a growing consensus among researchers that IT alignment in the digital transformation era is the function of various internal and external factors [22, 34]. Thus, identifying the internal and external organisational factors related to IT alignment is necessary to support organisations in their digital transformation journey. In other words, organisations in the public sector need to appreciate the significance of such factors as organisational structure, stakeholder relationships, and organisational agility to reach IT aligned position [20, 22, 30] which, in turn, supports their digital transformation efforts.

3. Research Methodology

3.1. Research strategies

The primary objective of our study is to explore the relationship between IT alignment and digital transformation in the public sector. To investigate how the various elements of IT alignment contribute to the success of digital transformation, a case study research strategy is deemed appropriate. In the extant IS literature, case studies are shown to be the most preferred research strategies among researchers [59]. IT alignment studies in general [60], and those focusing on public organisations have also been conducted using this research strategy [57]. Case studies are best suited when researchers are interested in exploring a complex

phenomenon in a natural setting [61]. As discussed above, managing IT alignment and digital transformation is challenging for public organisations. According to the extant literature, formulating and aligning the IT and overall organisational strategies is cumbersome within an organisational context where multiple or conflicting goals are exhibited [38, 39]. Given the complex organisational structure and a long list of stakeholders with varying interests in public organisations, we argue that case studies provide the opportunity to further our understanding of the relationships between IT alignment and digital transformation. Both [61] [62] categorise case studies under the constructivist research paradigm founded on the social construction of reality. The merit of constructivism is that it allows researchers to forge a collaboration with their participants [63]. Applying one or multiple data collection methods, researchers might gain access to stories from their participants describing their views of reality. The analysis of these stories, triangulated with multiple sources of evidence (various forms of complementary data), will enable researchers to better understand the phenomena under investigation [61]. **Figure. 2** illustrates the whole research process.

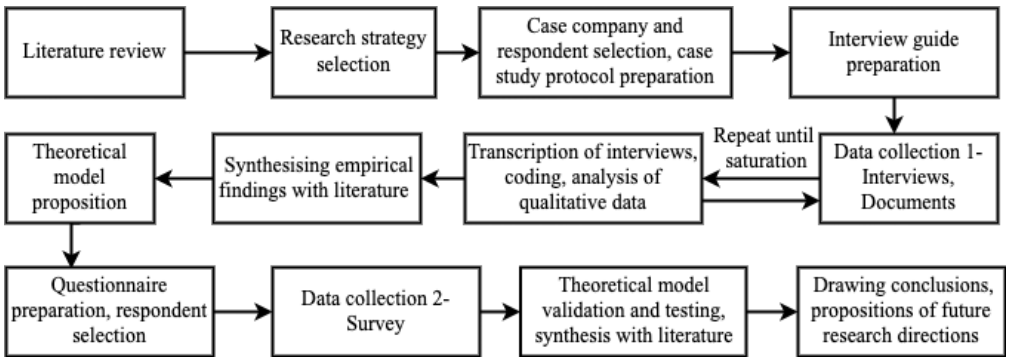

Figure 2: The research process.

Following the critical research appraisal guidelines [64], a single case study rather than multiple case studies was deemed appropriate to achieve the aim of the study—an in-depth investigation and detailed description of the relationship between IT alignment and digital transformation in a public organisation. While multiple case studies are popular among researchers interested in comparing cases testing replicability of empirical findings and theoretical applications, single cases provide rich insights [61, 64].

3.2. Data Collection Methods

To investigate the role of IT alignment in digital transformation within a public organisation, an interpretative approach was adopted. This approach is in line with the aim of our study, focusing on gathering data as provided by participants aiming to capture the holistic view and unique situation in the natural environment [65, 66]. One of the advantages of case studies is that it provides multiple data collection methods fitting the line of enquiry. However, [61] and [65] suggest the practice of triangulating data sources to improve the credibility of the findings of case studies. Thus, the data was collected through interviews, internal document analysis,

publicly available information from websites, and online questionnaires. Besides, a case study protocol was developed to guide the data collection, and data analysis procedures [61].

3.2.1. Qualitative Data Collection:

First, as the primary method of enquiry, we conducted semi-structured interviews with participants involved in the decision-making of the IT alignment and various digital transformation initiatives (see **Table. 1** for the complete list of participants).

Table 1: The complete list of interviewees with their roles and length of experience.

Code	Position	Domain	Work Experience	Interview Length
ITL1	Chief Information Officer	IT	12 years	55 min.
ITL2	Chief Information Officer	IT	7 years	60 min.
ITL3	Deputy Chief Information Officer	IT	11 years	60 min.
ITL4	Chief Digitalisation Officer	IT	9 years	50 min.
ITL5	Chief Digitalisation Officer	IT	12 years	50 min.
ITL1	IT Infrastructure Lead	IT	4 years	55 min.
ITL2	IT Infrastructure Lead	IT	3 years	65 min.
ITL3	Lead Network Administrator	IT	5 years	55 min.
ITL4	Information security Lead	IT	2 years	55 min.
ITL5	Information Security Lead	IT	3 years	60 min.
ITL6	System Administration Lead	IT	4 years	45 min.
Adm1	Development planning Head	Admin.	8 years	55 min.
Adm2	Housing Administration Head	Admin.	5 years	50 min.
Adm3	Health Services Head	Admin.	10 years	65 min.
Adm4	Health Services Head	Admin.	13 years	55 min.
Adm5	Local Law Enforcement Head	Admin.	7 years	55 min.
Adm6	Local Law Enforcement Head	Admin.	12 years	60 min.
Adm7	Education Bureau Head	Admin.	11 years	55 min.
Adm8	Economic planning Head	Admin.	12 years	50 min.
Adm9	Population Register Head	Admin.	6 years	65 min.
Adm10	Population Register Head	Admin.	9 years	55 min.

Consistent with prior IT alignment studies (e.g., [20, 60]), we approached leaders from the IT and administration sides. Probability sampling was deemed inappropriate for our study, given our aim is an in-depth insight, not a generalisation, of a phenomenon in the wider population [67]. Thus, as a starting point of purposive sampling, we adopted a criterion of selection of what [68] defined as "experts". Purposive sampling is a sampling strategy where researchers decide criteria for selecting participants based on the aim of the study or prior knowledge [67]. The interest was in recruiting those who have a deeper understanding of IT alignment and digital transformation resulting from their experience and functional status within their respective organisations. To ensure we have selected samples that could provide us with the richest information, we investigated the organisational structure of the case organisation. In

the second stage of our selection, the HR head as well as the IT and administrative leaders were consulted to establish the involvement of potential participants in decisions on IT alignment and digital transformation initiatives. This sampling strategy enabled us to compile multiple points of view on strategy formulation and the decision-making processes related to IT alignment and digital transformation.

According to the literature, there are different views concerning the number of interviews and research rigour. For instance, [69] does not recommend fixing a minimum number of interviews but suggests a purposive selection of participants. According to the authors, an appropriate selection of informants results in in-depth insights into a phenomenon under investigation. Another consideration that is gaining popularity among researchers is the point of data saturation. According to [70], the point of data saturation helps us decide whether the collected data is adequate or not. In this study, not more than 21 interviews conducted were necessary since no new themes were emerging, indicating the point of data saturation. The purposive selection of participants from the IT and administrative experts from the four public organisations under the Addis Ababa City Administration has provided in-depth insights on the IT alignment and digital transformation at the case organisation.

The interview questions were organised under the following four themes:
Part 1: General questions about the interviewees' background and functional role.
Part 2: Questions about the various aspects of IT alignment including strategy formulation, organisational structure, and relationship between IT and administration departments.
Part 3: Questions about the various digital transformation efforts within the city administration.
Part 4: Questions about the participants perception of the relationship between IT alignment and digital transformation.

3.2.2. Quantitative Data Collection:

In the second stage of our study, we collected survey data from a selected sample of experts in the Ethiopian public sector. Again, following the suggestion of prior IT alignment studies (e.g., [60, 20]), leaders from the IT and administration sides were targeted for the survey.

The criteria for selecting participants were based on experience and functional status within their respective organisations. As a minimum criterion, we selected participants from local, regional and federal government organisations with 100 or more full-time employees.

The online survey questionnaire was pre-tested with a sample of 25 leaders randomly selected in three public organisations in the capital of Ethiopia, Addis Ababa. Minor revisions were made to address identified issues with the questionnaire before the active link of the survey was sent to 589 experts. A control question was included in the questionnaire to make sure the respondents indicated whether they hold positions with responsibilities touching upon issues related to IT alignment and digital transformation. In addition to the demographic questions, a dummy question was used to exclude unserious responses. The online survey, active for 45 days, resulted in 402 complete questionnaires with a response rate of 68 per cent (see **Table. 2** for the demography of the participants and their organisational affiliations).

Table 2: Demography of our respondents, their roles and organisational affiliations.

Organisation Type	n	%	**Role**	**n**	**%**
Regional government	75	18.7	Executive	58	14.4
City administration	82	20.4	Middle management	191	47.5
Ministry	149	37.1	Team leader	110	27.4
Public University	46	11.5	Specialist	43	10.7
Justice	27	6.7	**Sex**	**n**	**%**
Other	23	5.7	Male	266	66.2
			Female	136	33.8
Organisational Size (Number of employees)	**n**	**%**	**Age**	**n**	**%**
100-250	42	10.4	20-30	56	13.9
251-1000	217	54.1	31-40	129	32.1
1001-5000	61	15.2	41-50	145	36.1
>5000	82	20.4	>51	72	17.9

3.3. Data Analysis Methods

Since the study made use of qualitative and quantitative data, two data analysis methods were used—thematic analysis, and Partial Least Square - Structural Equation Modeling (PLS-SEM).

3.3.1. Thematic Data Analysis:

As the primary source of evidence, we collected qualitative data in the form of interviews, which was complemented with internal organisational documents and publicly available information on the case organisation's website. To analyse this data, we adopted a thematic analysis method. The thematic data analysis method is widely adopted among qualitative researchers as it provides flexibility while enabling a rich and detailed account of data [71]. [72] argues that thematic analysis can be used in study areas where complex phenomena are explored. Prior IT alignment and digital transformation have also applied thematic analysis (e.g., [2, 36, 41]). For our study, the thematic analysis method was deemed appropriate as our aim was exploratory in nature, focusing on the relationship between IT alignment and digital transformation in a complex organisational setting.

[71] outlines six phases of thematic analysis, i.e., familiarising with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The procedure involves the search and identification of common threads. The themes emerge as researchers carefully read and familiarise themselves with the raw data. To help us in describing the phenomenon under investigation, one of the two forms of coding might be applied—inductive or deductive [73]. Inductive coding is the process of theme generating from a raw data without relying on prior theoretical and epistemological underpinning. On the other hand, deductive coding is a procedure whereby a researcher starts generating themes based on existing theories or frameworks. Even though inductive coding is common among exploratory studies, [73] argues that a hybrid approach incorporating both inductive and deductive theme

generation can improve the rigour of a qualitative study. Thus, we adopted both inductive and deductive coding in our analysis. First, we developed the initial codes and sub-themes from our transcribed data following the inductive approach. Later, we mapped and grouped these themes deductively using a priori template [74]. The conceptual research framework (i.e., based on prior IT alignment and digital transformation literature) shown in **Figure. 1** was used to formulate the priori template. As recommended by [66], the whole data analysis process was run as an iterative process. **Table 3** illustrates how the initial codes, the sub-themes, and themes were generated.

Table 3: Coding examples demonstrating the development of themes.

Excerpt from interviews	**Initial code(s)**	**Sub-theme(s)**	**Themes**
"...many of us have been involved in the planning of the major IT systems to improve the services we deliver to our citizens..."	Planning IT system, Improving service	IT planning, Organisational-goal	IT strategy, Organisational-strategy
		Decision making	IT Governance
"We have several interest groups asking for the allocation of IT resources ... we need to make choices since we can't do all at once"	Interest groups, Make choices, stakeholders	Stakeholders	Stakeholder-relations,
		Prioritisation	IT Governance

3.3.2. Partial Least Square - Structural Equation Modeling (PLS-SEM):

PLS-SEM, a form of multivariate data analysis method, was adopted to analyse the quantitative data. PLS-SEM is one quantitative data analysis method that IS researchers have widely applied in recent years. [75] argues that the method's popularity is primarily because it supports the estimation of complex models with a large number of constructs without the need to assume normal data distribution. For our study, however, the method is deemed appropriate since our aim is to estimate the influence (i.e., casual prediction) of various organisational and managerial factors on IT alignment. Compared with other methods, PLS provides an advantage over other SEM methods as it assesses relationships between many constructs, with a small sample size [76].

As suggested in the literature [75], the data analysis was conducted in two steps—evaluation of the measurement model followed by assessment of the structural model. First, we evaluated convergent validity, indicator collinearity, statistical significance, and relevance of the indicator weights. Convergent validity indicates the extent of correlation between two measurement items that are chosen to measure the same construct. In other words, if the values from the two measures are close, this demonstrates they are the same construct. Indicator collinearity, on the other hand, tells us whether two or more indicators are highly correlated resulting in high standard error. The statistical significance and relevance is important to indicates how significant or relevant are the indicator weights in forming the construct.

In the second step, we evaluated the structural model by applying three criteria—collinearity, the model's predictive power, statistical significance and relevance of path coefficients. The model's predictive power refers to the explanatory power of the model. On the other hand,

statistical significance and relevance of path coefficients tells us the strength of the influence of one construct on the other. Version 3.3.9 of SmartPLS software was used to run the analysis [77].

4. Preliminary Results

Using the technology enactment- and public value theories as a lens of analysis, the study established the significance of IT alignment for public organisations as they embark on their digital transformation journey. In response to the first research question, the qualitative study results indicate that the efforts toward improving IT alignment resulted in various benefits. These benefits are mainly related to the realisation of the anticipated outcomes of successful digital transformation—creating added value, improving operational efficiency, and better management of stakeholder relationships.

4.1. The Role of IT Alignment for Digital Transformation

The starting point for our analysis was to establish the role of IT alignment for a successful digital transformation in the case organisations. In response to our first research question, interviews with our respondents and the analysis of internal documents indicate that public organisations expect digital transformation to result in (1) new outputs, (2) improved outcomes, and (3) measurable impact on society. However, to realise these objectives, the alignment between the introduction of new technologies and organisational arrangements needs to be maintained.

Our study's results indicate at least three ways that IT alignment can affect digital transformation in the public sector. First, as researchers already pointed out (e.g., [20, 24, 34]), organisations that maintain IT-aligned positions seem to improve their value from the use of emerging digital technologies. For instance, as one of the dimensions of the IT alignment construct [20], clear communication between IT and administration leaders is critical when IT and organisational strategies are formulated and implemented. The fit between these strategies and other organisational settings (structure, human resource practices) enables the appropriate application of digital technologies supporting the goal of public organisations. Second, recognising the significant role of IT alignment also helps leaders to acknowledge the continuous adaptations required as organisations navigate through turbulent business, political and technological landscape. Thus, managing activities related to IT alignment promotes flexible organisational structure and IT infrastructure, accommodating the introduction of new technologies. Third, the role of IT alignment in improving business processes by facilitating the integration of new technologies into the existing business processes is acknowledged by our respondents. This finding is consistent with prior IT alignment studies in the private sector [24, 78]. However, to realise these benefits, our study's result suggests that various organisational and management-related factors must be appropriately managed (see **Figure. 3** for the thematic map of these factors).

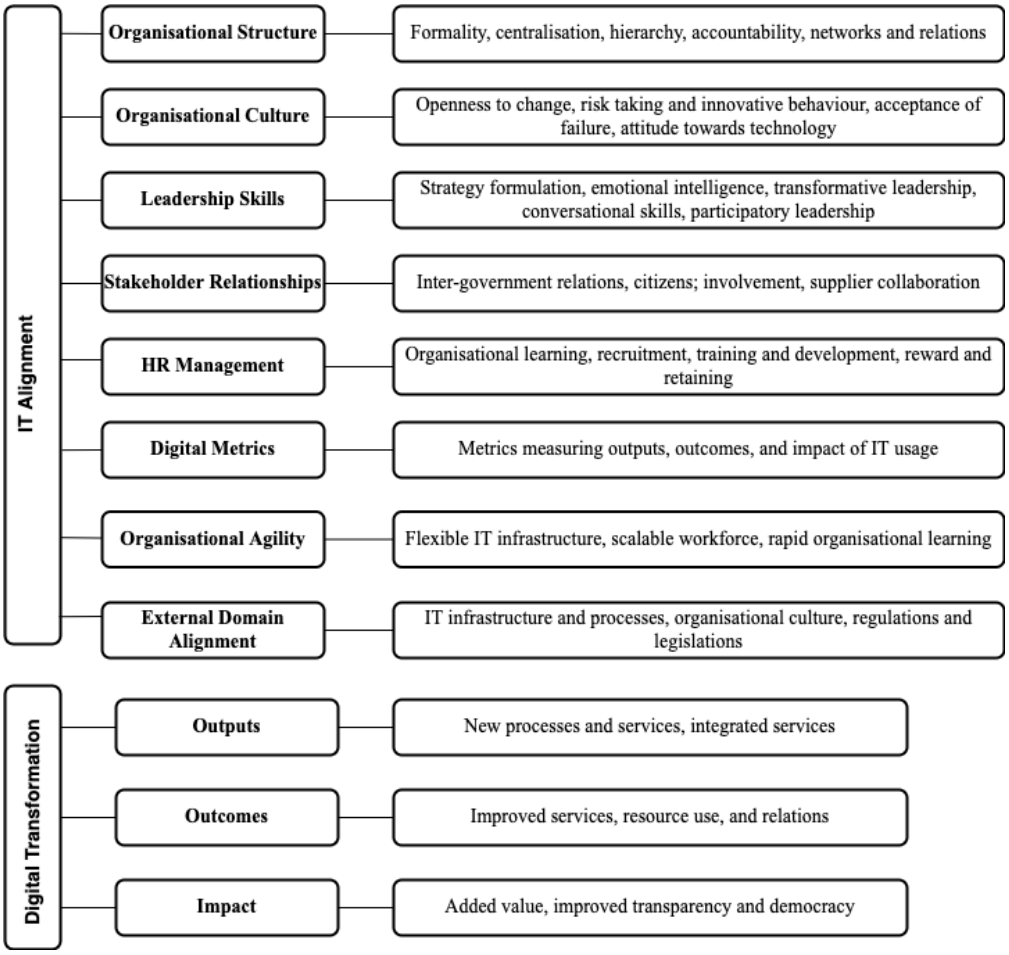

Figure 3: Thematic map depicting the determinant factors influencing IT alignment in public organisations.

4.2. Improving IT Alignment in Public Organisations during Digital Transformation

The promise of digital transformation to revitalise the public administration resulting in improved service delivery and satisfying citizens' expectations becomes challenging for leaders [36, 40, 43], the role of IT alignment is being recognised in the IS literature [34]. The responses from our interviews also revealed that leaders are under tremendous pressure (from citizens and elected leaders) to transform the public sector using emerging technologies. However, various factors categorised and presented as organisational- as well as leadership and management factors are making their work difficult. While organisational factors (i.e., organisational structure, organisational culture, and organisational agility) cover overall organisational attributes, the leadership and management factors (i.e., leadership skills, use of digital metrics, stakeholder relationships, external domain alignment, and human resources management) reflect leaders' approaches towards IT alignment during digital transformation.

The result of our qualitative data analysis and synthesis of the extant literature was used to help us hypothesise the relationship between identified factors, IT alignment and digital transformation. **Figure. 4** shows our theoretical model and the hypothesised relationships between our constructs. Quantitative data was used to empirically validate the theoretical model and respond to the second research question.

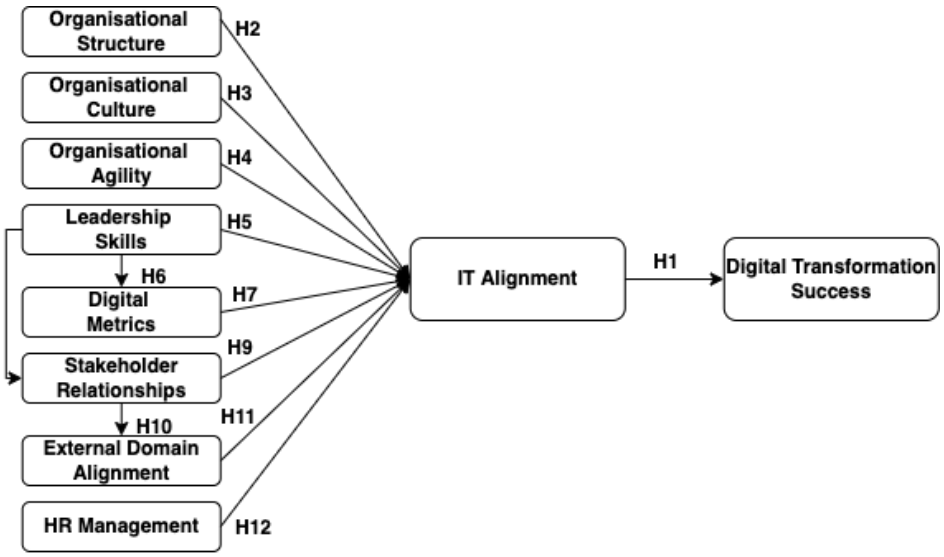

Figure 4: Theoretical model

Since we have already established a positive relationship between IT alignment and digital transformation, our next step was exploring how organisations could improve the degree of their IT alignment. The quantitative data analysis was invaluable in helping us explore what is expected of public organisations to achieve and maintain IT alignment. We argue that it is in the best interest of public organisations to pay sufficient attention to the organisational and management-related factors as they embark on the digital transformation journey. Accordingly, the PLS-SEM analysis indicates that the strong influence on IT alignment was found to be from organisational culture, organisational structure, leadership skills, stakeholder relationships, and human resources management practices. The effect of the remaining three factors on IT alignment was moderate (i.e., organisational agility) and small (i.e., digital metrics use and external domain alignment). However, our results show that all hypotheses are supported.

On the other hand, we have also established the relationship between some of the constructs (i.e., factors influencing IT alignment). For instance, leadership skills were related to stakeholder relationships, which, in turn, affects external domain alignment. The study has also revealed interesting findings that are contradictory to prior research. For instance, the influence of external domain alignment on IT alignment was found to be strong in public organisations [40, 41, 79]. However, our result indicates that external domain alignment has the least influence on IT alignment. Besides, prior research on the relationship between organisational agility and IT alignment provides contradictory findings [80, 34]. Our results indicate that organisational agility moderately influences IT alignment. This is consistent with another study investigating

IT alignment and organisational agility in a public sector [81].

As indicated in **Figure. 3**, the list of factors that was found to influence IT alignment seems to be long. Given the dynamic business, political and technological landscape, appropriate response in keeping an IT-aligned position is imperative for today's organisations. As the extant literature suggests (for instance, [27, 24]), leaders need to be systematic in their efforts to maintain IT alignment appropriately deploying the resources at their disposal. However, our analysis of the quantitative data is informative to suggest what public organisations need to focus on. For instance, the path analysis indicates that organisational culture, organisational structure, and leadership skills were found to be the most critical of the factors that determine the degree of IT alignment. Thus we propose the following.

Organisational culture: As digital transformation is an organisational-wide change that touches upon everyone, the involvement and active participation of all is essential. As our data suggests, the introduction of new technologies and business processes could only succeed when a conducive culture that accommodates change is in place. However, we argue that leaders need to take the major role in embracing change and encourage employees to follow. [20] argue that organisations with culture recognising IT as a driver of the overall organisational strategy are likely to exhibit a relational leadership where the business and IT units consider themselves as partners. Besides, organisations undertaking digital transformation need to promote a positive attitude towards new technologies. Acceptance of new technologies also mean tolerance of failure and risk taking behaviour as employees take steps to learn and adapt the use of emerging technologies.

On the other hand, our data and the findings of prior studies [82, 2] support the notion that digital transformation is intended to improve the creation of added value through innovation (i.e., new way of doing things). As such organisations need to create opportunities and encourage the application of technologies that could improve or radically change public service offerings.

Organisational structure: As recognised in the prior studies (for instance, [47, 83]) leaders need to appreciate the significance of appropriate organisational structure for IT alignment and digital transformation. The structure choices should enable adaptation to the environmental changes as well as maintain stability and accountability. According to [14, 83], public organisations seem to be reluctant to alter formal structures primarily to maintain public legitimacy and accountability. However, there are still possibilities to influence the informal arrangements that could supplement the existing formal structures. The analysis of our interviews and prior findings [84] suggest that informal arrangements contributed to some of the success of implementations of new systems at the case organisations. Thus we propose that public organisations should encourage less formal and more flexible working arrangements. As the benefits of intra-departmental and personal relations were found to be useful, we also suggest that leaders should encourage networks as well as inter-departmental and personal relations to improve IT alignment.

Leadership Skills: As public organisations attempt to align their IT and overall organisational strategies during digital transformation, the skill sets expected from leaders has become considerable. For instance, [34] argues that leaders in the digitalised world need to acquire and continuously update skills related to the management of emerging technologies. Besides, the analysis of our interviews have also revealed that leaders competence and versatility affects many of the factors identified to have influence on IT alignment. Thus we propose that leaders

need to keep their skills updated particularly in the areas of strategy formulation, transformative leadership, conversational skills and participatory leadership.

5. Contributions

5.1. Research Contributions

Despite the long list of promises of many digital transformation initiatives, public organisations still struggle to improve the value they gain from their investment in emerging technologies. This challenge justifies researchers' call for information systems studies focusing on managing organisation-wide changes to accommodate the use of new technologies. The contribution of this study to research is in line with what [85] referred to as a model-theoretic approach to knowledge accumulation. This is one of the dominant perspectives in the IS research domain. Using the model-theoretic approach, a researcher designs a context-specific study to investigate and later test a phenomenon. In contrast with the law-statement approach to knowledge accumulation, our empirical study was not aimed at testing whether a theory is true or false. On the other hand, the contribution of this study to research builds on what is already known to establish the relationship between IT alignment and digital transformation within the public sector context.

Given the scarcity of IT alignment and digital transformation studies in the public sector, the result of the study might be a starting point for further studies. For instance, to the best of our knowledge, this is the first study that has shed light on the organisational and managerial factors related to IT alignment while digital transformation is pursued (i.e., within the public organisations' context). Even though the relationship between IT alignment and digital transformation is already established in the literature, the causal relationship between the constructs were not investigated. The theoretical model developed could be tested in different public organisational settings to explore appropriate ways of improving IT alignment enabling successful digital transformation.

5.2. Practical Contributions

Leaders in the public sector find it difficult to manage their digital transformation initiatives as they operate in a complex organisational setting. The rigid organisational structure and decision-making arrangements leave not much space for flexibility. However, it is paramount to recognise the various internal and external factors affecting their work towards integrating new digital technologies. Our findings have pointed out multiple areas of concern related to IT alignment. The key implication of the study for leaders in the public sector is the recognition of the significance of IT alignment as organisations continue to introduce new technologies. Building on the findings of prior studies, the main objective of our study was to empirically investigate the relationship between IT alignment and digital transformation in the context of public organisations. Consistent with what has been reported in the literature, our data support the claim that IT alignment has a positive relationship with digital transformation success. Particularly, the results have pointed out how the various factors related to IT alignment need to be managed to ensure successful digital transformation. To this end, our qualitative data

analysis has revealed eight critical factors to improve IT alignment, supporting successful digital transformation. In addition to identifying these factors, we have also used quantitative data to help us determine the degree of influence of these factors on IT alignment. The study has also proposed actionable measures to address the essential determinant factors to realise the anticipated results of digital transformation.

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