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Assessing the Impact of Digital Transformation on Project Success: Evidence from Saudi Organizations

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2. Chapter 2: Literature Review

2.1. Introduction

This chapter provides an extensive overview and evaluation of existing knowledge regarding how digital transformation affects the outcomes of projects completed by Saudi Arabian organisations. The content of the chapter has been divided into three major categories that relate directly back to the research model described in the previous chapter. The first section (2.2) discusses the independent variable — digital transformation — by providing definitions and breaking down the variable into its individual pieces; digital (1) strategy; (2) technology adoption; and (3) culture; as well as how they can potentially fit into two opposing theoretical frameworks, the Technology-Organisation-Environment (TOE) model (Tornatzky & Fleischer, 1990) and the Resource Based View (RBV) model together with the Dynamic Capabilities view (Barney, 1991; Teece, 2018). The second section (2.3) focuses on the dependent variable, project success, and analyses how the definition of project success has evolved over time from the original Iron Triangle concept — based on scope, cost and time — to the modern multi-dimensional concept of project success; which includes elements such as quality, stakeholder satisfaction and strategic value (Shenhar & Dvir, 2007; Müller & Turner, 2007). In Section 2.4, we present an extensive and detailed analysis of the empirical studies that have investigated both the effect of digital transformation on project performance and project performance's effect on digital transformation; identifying commonalities between findings, inconsistencies between studies, and, more critically, identifying the empirical gap for Saudi Arabia and other developing nations vis-à-vis the relationship between digital transformation and project performance. Section 2.5 concludes this chapter through a synthesis of our literature review; presenting the justification for the proposed conceptual model outlined in Assignment #2, which identified both the mediating effects of organisational digital capabilities and the moderating effects of organisational context and the environmental, or macro, context to the relationship between digital transformation and project performance. Together, Sections 2.4 and 2.5 will provide the theoretical and empirical foundations for the research questions and objectives which guide the study, as well as for the study's hypotheses.

2.2. The Independent Variable

2.2.1. Defining Digital Transformation

Digital transformation (DT) has been one of the most talked about topics in both management and information systems; however, there remains much disagreement regarding the definition of DT. To help clarify things, Vial (2019) completed a systematic literature review of digital transformation and established a single unifying definition of DT: “Digital transformation is the process by which organizations adapt to changes in their external environment by leveraging digital technology (i.e., web, mobile, or cloud) to change their path of value creation (e.g., the way they deliver products or services to their customers), while managing the structural changes and organizational barriers that contribute to both positive and negative outcomes resulting from this process.” This definition is important because it conceptualizes DT as being an ongoing, organization-wide strategic adaptation process initiated by external digital disruptions and mediated through internal organizational responses, not just as a one-time discrete event of adopting a new technology. Building on this definition, Matt et al. the report of their research findings, which show that digital transformation affects all areas of an organization. They also found that although organizations may rely primarily on existing technology to transform their processes, they can also use new technologies to elevate their capabilities beyond simple process improvement. Four key factors describe strategies and how they relate to digital transformation (2015). Kane et al. (2017) define “digital maturity” as the extent of an organization’s success in integrating digital technology into its culture and strategy, as opposed to simply adopting some digital software or technology, because overall digital maturity is a better predictor of performance than simple technology adoption. According to Gartner’s (2022) definition, digital transformation is the use of digital capabilities to create better processes, products, assets, efficiency, enhanced customer value, and improved risk management, while finding new ways to monetize. In summary, these definitions offer three key characteristics of digital transformation: it is enabled by technology; it is not dictated by technology; successful digital transformation requires organizational and strategic adaptation; and ultimately, the goal of digital transformation is to generate additional or improved value for the organization and all stakeholders. This conceptual framework forms the basis for the operationalization of the independent variable in this study.

2.2.2. Dimensions of Digital Transformation

As defined in the conceptual framework outlined in chapter 1, digital transformation will be analyzed in this study as consisting of three main components: digital strategy, adoption of digital technology, and culture around digital technology.

Digital Strategy. A digital strategy is an organizational-level plan that specifies how an organization will use digital technologies to gain competitive edges and support more mission goals and objectives. Digital strategies differ from traditional IT strategies, which are usually functional in nature, also include other functions, in that they are seen as business strategies, since they view the use of digital technologies as core rather than adjacent to creating value for the organization. In other words, a digital strategy provides the roadmap for allocating resources and increasing technology investments and aligning with digital project portfolios; therefore, it is proposed in this research study that digital strategies are a direct predictor of project success (H1).

Digital Technology Acceptance. The second dimension of the study is the empirical nature of the adoption and use of the technologies identified and described as digital technologies in the literature in project environments. Of particular interest in this study are four clusters of technologies that are noted to be widely referenced in project management: (1) Artificial Intelligence (AI), which includes predictive scheduling, risk forecasting, and automated resource allocation; (2) Cloud Computing, which includes the ability to work collaboratively on a real time basis, have a centralized database and have a scalable project infrastructure; (3) Building Information Modelling (BIM), which is particularly relevant for construction and infrastructure projects, allows an integrated design, clash detection, and lifecycle management (Eastman et al., 2018); and (4) the Internet of Things (IoT), which allows real time site monitoring, asset tracking and sensor-based progress verification. Previous research has demonstrated that companies that adopt these technologies demonstrate improved accuracy in planning, improved team collaboration, and decreased scope creep (Alias et al., 2014). These studies serve as the empirical foundation for hypothesis H2 currently being tested.

Digital culture. The third element in a company's digital transformation journey is digital culture, which refers to the underlying values, beliefs, and behavioral standards that guide how employees within an organization make use of resources, embrace risk-taking and experimentation, rely on data to make decisions, work across functional boundaries, and adopt new knowledge in relation to the use of digital technologies (Kane et al., 2017).

Research conducted by Westerman et al. (2012) demonstrates that organizations identified as having "mastered" the digital environment do not necessarily achieve that status due to their level of technical sophistication but instead due to their abilities related to culture and leadership within the context of their digital culture, thereby establishing that having technology alone is not enough to facilitate technology adoption without first creating supportive cultural and behavioral conditions. It is believed that a strong digital culture can help to improve the diffusion of digital collaboration tools throughout project teams, resulting in less resistance to using new technology to perform work, thus addressing hypothesis three (H3) of the current study.

2.2.3. Theoretical Underpinnings

The Technology-Organization-Environment (TOE) Framework (Tornatzky & Fleischer, 1990) states that the choice an organization makes about adopting and establishing new technology is determined by three specific contexts: 1) The technological context - all relevant internal and external technologies available to the firm and their related characteristics; 2) The organizational context - the size of the firm, the type of management structure, the quality of the human resources in the firm and the amount of slack resources; and 3) The environmental context - the industry and competitors in which the firm operates, the regulatory environment the firm is subject to, and the current macroeconomic conditions that affect the firm's operations. According to Baker's 2012 study, which analysed decades worth of research into the Technology-Organisation-Environment (TOE) framework, this framework has been found to be one of the most empirically valid and commonly utilised theories to explain the technology adoption behaviour of organisations overall because it includes both internal capacity (of an organisation) and external pressures (from environmental factors) as two factors that can affect an organisation's adoption of a particular technology (e.g. digital transformation). This is particularly true for the Saudi Arabian organisations that will be impacted by the pressures to implement digital transformation as a result of Vision 2030 (Saudi Vision 2030, 2016). Therefore, it is appropriate to use the TOE framework as a theoretical basis for developing a research model that will demonstrate how the organisational and environmental characteristics of organisations (e.g. type of industry, size of organisation and alignment with Vision 2030) may moderate the relationship between and technology related variables (e.g. digital transformation), on the one hand, and organisational outcomes (i.e. successful completion of a project), on the other, in this research by theorising that how these factors will influence the degree of relationship

between the technology-related variables and organisational outcomes will depend on the organisational and environmental circumstances under which the organisation is operating at any point in time.

Fundamentally, the Resource-Based View (RBV), as suggested by Barney in 1991, states that sustained competitive advantage arises from the unique, valuable, and inimitable (so-called VRIN) organizational resources and capabilities. When applied to digital transformation, the RBV contends that digital technology alone is seldom a source of sustained competitive advantage (these technologies are usually available to organizations competing against each other within the marketplace), but capabilities created around digital technologies will often provide the organization with a source of sustained competitive advantage. The concept of dynamic capabilities, proposed by Teece (2018) as a way of extending RBV, establishes the enhancements to an organization that allow them to appropriately sense opportunities for growth, capture those opportunities by reconfiguring organizational resources, and adapt their asset bases to meet the demands of changing environmental factors. According to the work of Karimi and Walter (2015), who conducted empirical testing in the context of how the newspaper industry responded to the digital disruption; they found that dynamic capabilities, as opposed to technology adoption per se, were the best predictor of successful organizational adaptation. This theoretical lineage provides a basis for the present study to conceptualize organizational digital capabilities as an intervening (mediating) variable (H4): digital transformation initiatives such as strategy development, technology adoption, and culture development lead to the establishment of organizational digital capabilities, which as mediating variables lead to improved project success outcomes rather than directly resulting in project success through a chain of causation.

2.3. The Dependent Variable

2.3.1. Defining and Tracing the Evolution of Project Success

The concept of what represents 'project success' has been defined in many different terms across different periods within the discipline of project management, and remains one of the more contentious terms. According to Ika (2009) when carrying out a content analysis of publications from project management journals dating back over thirty years, it is evident that project success has often been defined by researchers very differently, and even within studies, there is often an overlap between project success and project management success – i.e., the way researches have been confused about whether or not the project provided the

expected business benefit versus the manner in which it was executed, i.e., the manner that the project was delivered according to how it was planned. This difference between project success and project management success is therefore very important for our review of the literature; it helps to identify the property of 'project success' as having a wider range of interpretation (i.e., focused on the end result) than does the property of project management success (i.e., an emphasis on the manner/projects executed in accordance with established goals).

For many years, the way that people thought about project success was based heavily on what became known as the Iron Triangle; that is, achieving simultaneously three objectives: scope, cost, and schedule. This three-part model dominated project management in the second half of the 20th century as it provided measurable, quantifiable evidence of project success. However, the Iron Triangle has received substantial criticism for this narrowing of the project definition of success. According to Pinkerton, as referenced in Shenhar & Dvir (2007), there is a much larger body of more recent research that asserts that a project can meet the three criteria of time, cost and scope precisely yet be considered a failure if it did not meet its stakeholders' needs or provide strategic value from which the project was commissioned and conversely, a project can be considered successful even though it was over budget or took longer than planned; if the project provides significant strategic or financial benefits.

2.3.2. Multi-Dimensional Criteria: From the Iron Triangle to Contemporary Models

To address the shortcomings identified from earlier studies into project management success measures, Shenhar & Dvir (2007) developed what they termed "The Diamond Approach," which is a multi-dimensional framework for measuring project success. The Diamond Approach expands the concept of project success beyond the Iron Triangle (scope, time, cost) to consider the project's impact on customers, businesses and directly on its own success, as well as the project's ability to prepare for future projects. The Diamond Approach defines success using both short-term efficiencies (as represented by the Iron Triangle) and long-term effectiveness (as represented by customer satisfaction and strategic value), and claims that the importance of these different measures varies depending on such factors as project type (e.g., one-off vs. continuing) and the level of uncertainty and complexity associated with the project. Müller and Turner (2007) conducted an empirical study of over 400 projects across multiple project types, forms of application/field, and personal

characteristics of project managers. They found that the success criteria selected by project managers varied consistently between different types of projects and was associated with the project managers' backgrounds, no single, universal measure of success could accurately represent satisfaction with any project. Pankratz & Basten (2018) looked at the relationship between managers' mental models and their attitudes toward IT project success. They concluded that, in addition to the cost and schedule of IT projects, managers often believe that how satisfied other people are with the outcome of projects contributes significantly to the perceived success of those projects. Overall, this area of study has contributed to an emerging consensus among scholars proposing that project success should be evaluated based on 5 interdependent measures: 1) Scope — All project deliverables were produced, consistent with initial agreements; 2) Cost — All project costs were incurred within the established budget; 3) Schedule — All project schedule commitments were met; 4) Quality — The extent to which project deliverables meet established (defined) technical and functional requirements; and 5) Stakeholder Satisfaction — The extent to which end-users, sponsors, and other key stakeholders perceive value and viability in the delivered project.

2.3.3. Justification for the Criteria Adopted in This Study

In this study, we define project success based on five criteria - scope adherence, cost performance, schedule performance, quality and stakeholder satisfaction. There are three main reasons for this criteria structure. One, this criteria structure incorporates the historical and measurable components of the Iron Triangle (scope, cost, schedule) together with the perceptual and strategic components (quality and stakeholder satisfaction) of project success as identified by the literature reviewed (Shenhar & Dvir, 2007; Müller & Turner, 2007). Two, the criteria structure is fully compatible with quantitative measurement using established Likert-scale instruments because the methodology used in this research is positivist and deductive, and will use PLS-SEM for hypothesis testing. Thirdly, and most importantly to this study's relevance, there are theoretically sound links between the independent variables described above and their corresponding dimensions on the digital transformation (i.e. digital adoption of technology (e.g. AI scheduling), and Bim Clash) and will directly influence schedule/cost/quality; digital strategy will connect project scope to organizational objectives; and digital culture will connect to how collaborative processes affect stakeholders' satisfaction. These clear theoretical connections between independent variables' dimensions and dependent variables' criteria serve to provide conceptual support for the hypothesis development in Chapter 1 (Hypotheses 1 - 4).

2.4. The Relationship Between the Independent and the Dependent Variables

2.4.1. Synthesis of Existing Empirical Evidence

Research into the link between digital transformation and project outcome measures has been built through constantly growing empirical studies, although these studies remain fragmented with respect to geography, methodology, and theory (as discussed below). Alias et al. (2014) did exploratory research regarding critical success factors related to project management practices and their association with improved planning accuracy, better team coordination, and limited 'scope creep' through the use of digital project management tools (i.e., real-time dashboards, collaborative platforms) which offered some of the earliest empirical evidence for a positive relationship between digital transformation and success in project-related outcomes, and in Doherty et al.'s (2012) three case studies of systems development projects it was evident that the realization of (or lack of realization of) benefits from the projects was dependent not only upon implementation of new digital systems but also on the ability of the organization to manage the resulting organizational change; thus suggesting that the level of organizations' capabilities not only mediates the impact of digital initiatives on project success but provides additional support for the role of digital capabilities as proposed in this study's model (H4). Matt et al. The success of digital transformation strategy typologies was conceptualised in 2015 and it was established that success for either teams or projects attempting digitally enabled change would be best determined based on how integrated the digital strategies are with other factors, specifically financial & organisational structure. This reinforces the theoretical importance of a firm's digital strategies (H1) as a driver of successful project-level outcomes.

In addition to these aforementioned individual studies there are numerous additional publications on the topic of digital transformation that provide convergent evidence (albeit indirect) to support the hypothesized relationships. For example, Kane et al. (2017) demonstrated statistically that organizations with higher levels of digital maturity (an aggregate measure of strategy, culture, and capability) consistently outperformed organizations with lower levels of digital maturity on several key performance indicators. Similarly, Westerman et al. (2012) found that 'digital masters' achieved superior financial performance primarily through superior execution capability, not necessarily by superior technology. Zaoui and Souissi (2020) conducted a systematic review of the literature on digital transformation roadmaps across several industries and found that the primary barriers to achieving success in digital transformation are of an organizational and cultural nature

(e.g., resistance to change, skills gaps and misaligned leadership) rather than purely technological, further supporting the importance of both digital culture (Hypothesis 3) and organizational digital capability (Hypothesis 4) as critical (and often underestimated) factors determining outcome success.

2.4.2. The Research Gap: Saudi Arabia and Emerging Economies

However, numerous studies — for example, Alias et al (2014), Doherty et al (2012), Matt et al (2015), Kane et al (2017) and Westerman et al (2012) as well as the majority of studies described in this paper — derive their sample from organizations in developed economies. Specifically, most studies have used samples from North America and Western Europe. The research conducted using samples from developed economies has created a significant gap in knowledge since existing foundational studies do not adequately account for the variation between developed and emerging markets with respect to institutional frameworks, regulatory environments, cultural differences and resource constraints (Doherty et al., 2012). Therefore, it is reasonable to conclude that because of the nature of the TOE framework and the manner in which technology-adoption outcomes are moderated by organisational and environmental context, findings deriving from a particular institutional context cannot be generalised to all institutional contexts.

The gap exists in a very obvious way with very serious impacts; it shows very clearly with regard to Saudi Arabia. As documented in Chapter 1, Saudi Arabia has the most extensive national digital transformation program in the world, under the Vision 2030 program, to transform the national economy and grow workforce skills and capabilities by 2030 (Saudi Vision 2030, 2016). The organizations that operate in Saudi Arabia, especially within the project-based sectors (e.g., construction, energy, and the delivery of government services), are currently also implementing a significant number of extremely complex, high-value projects that are critical to the Kingdom's national agenda. According to Al-Mudimigh et al. (2011), Saudi institutional environments embody unique elements (i.e., public-private partnership interactions, Saudization labour policies, and Islamic business ethics) that distinguish the Kingdom from the Western context of nearly all previous research focusing on technological innovations. There is virtually no qualitative empirical research on how digital transformations are perceived and realized by project-level organizations in the Kingdom of Saudi Arabia; existing studies, such as those by Al-Mudimigh et al. Studies of contemporary technology adoption (e.g., university portals) often tend to focus on the level of

implementation rather than the performance outcomes associated with that technology's use. In addition, the existing global literature related to the relationship between digital transformation and project success has rarely incorporated traditional technology adoption theory (such as the technology–organization–environment [TOE] framework) into its exploration. As Oliveira and Martins (2011) point out in their examination of models of information technology adoption, very few empirical studies have examined technology adoption models from within the context of project management; rather, most models have been used exclusively from a firm perspective. As such, this paper aims to fill the aforementioned theoretical and empirical gap by providing an empirical validation of the relationship among digital transformational processes, digital capabilities, and project success, using an integrated (TOE and resource-based view [RBV]) theoretical framework to examine how digital transformational processes (i.e., digital strategy, technology adoption, and digital culture) lead to project success, mediated by organizational digital capability, in the unique institutional context of Saudi Arabia.

2.5. Conclusion

In this chapter, existing literature is examined with respect to the two core constructs of this study and to their relationship with one another. Digital transformation was determined to be best defined as an organisational adaptation process that has both multi-dimensional and strategy-based elements (consisting of digital strategy, digital technology adoption and digital culture) (Vial, 2019; Matt et al., 2015; Kane et al. , 2017) and situated within the technology, organisation and environment (TOE) framework (Tornatzky & Fleischer, 1990; Baker, 2012) as well as the resource-based view (RBV) and dynamic capabilities perspectives (Barney, 1991; Teece, 2018) in Section 2.2. The evolution of project success from the narrow ‘Iron Triangle’ to the broader and current five-criteria multi-dimensional construction including: scope; cost; schedule; quality; and stakeholder satisfaction was examined in Section 2.3 (Shenhar & Dvir, 2007; Müller & Turner, 2007; Ika, 2009), providing justification for the use of this model in this study. In Section 2.4, the empirical literature linking digital transformation to project performance was critically synthesised (Alias et al., 2014; Doherty et al. , 2012; Matt et al., 2015; Kane et al. , 2017) and the principal research gap driving this study with limited work done in Saudi Arabia and other developing countries on this relationship, despite Saudi Arabia’s major investments strategically directed toward digital transformation through Vision 2030, was specifically stated.

In summary, the body of literature examined in this chapter provides a compelling theoretical foundation for the conceptual model developed in Assignment #2. The Technology-Organisation-Environment (TOE) framework provides the necessary theoretical justification for including organisation and environmental contexts (e.g., industry type, organisation size, and Vision 2030 alignment) as moderating variables because the TOE framework states that technological aspects are contingent upon, or conditioned by, organisations and their characteristics. In addition, the Resource-Based View (RBV) and Dynamic Capability perspectives provide justification for including organisational digital capabilities (e.g., the ability to sense, integrate and reconfigure digital resources) as a mediating variable because those perspectives suggest that technology itself will not provide an enduring source of competitive advantage, while the organisation capabilities built around technologies will provide the competitive advantage. The empirical evidence gathered through case studies (Doherty et al., 2012; Kane et al., 2017; Westerman et al., 2012) suggests that digital capabilities, rather than just the adoption of technology, are the more direct contributors to successful outcomes, thereby supporting the theoretical rationale for partial mediation described in Hypothesis 4. There is an explicit lack of empirical evidence from both Saudi Arabia and the rest of the emerging markets, confirming that there is a gap through every study reviewed in this chapter; therefore, this research stands as a completely new and necessary project in order to test the integrated theoretical models of the TOE and RBV, both created using empirical data collected from project managers working under the unique institutional environment present in Saudi Arabia.