



An-Najah National University
Faculty of Graduate Studies

**INVESTIGATING THE READINESS OF ICT
PALESTINIAN ORGANIZATIONS FOR
DIGITAL TRANSFORMATION**

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Dedication

I dedicate this thesis to my beloved family; without their care, support, and encouragement, this thesis would have never been completed. In addition, to my mother's soul that I am sure she will be proud of this moment.

Acknowledgment

I cannot find the words to express my special gratitude to all the people who have generously supported me throughout the stages of writing this thesis.

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Declaration

I, the undersigned, declare that I submitted the thesis entitled:

INVESTIGATING THE READINESS OF ICT PALESTINIAN ORGANIZATIONS FOR DIGITAL TRANSFORMATION

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: Aymam Muraweh Abu-Mansour

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Date: 27/01/2022

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INVESTIGATING THE READINESS OF ICT PALESTINIAN ORGANIZATIONS FOR DIGITAL TRANSFORMATION

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ABSTRACT

Background: The digital transformation (DT) shows the changes within society in all human life aspects. It became an important subject in the last decades both in academics and consultancy, due to the massive growth in digital technologies. Therefore, top management levels realize this significance, and they think about how to implement it within their organizations to get new opportunities, competitive advantages, new revenue streaming, and customer experience.

On the other hand, DT implementation may face many challenges and barriers, which may lead to a risk of failure in implementation. In order to minimize this risk, they need to apply readiness assessment for the organizations prior to the DT considering it the initial stage of the process.

Objective: In Palestine, the ICT sector experienced high growth. Penetration ratio of technology is high within Palestinian society, and government represented by MTIT gives the DT the highest priority in its agenda to improve all over governmental e-services that are offered to citizens. All of these factors have led the ICT and Telecom organizations in Palestine to consider the DT process the top point in their agenda. However, there is a considerable gap in digital transformation studies inside Palestine. Hence, this study aims to fill this gap and to measure the readiness of Palestinian Telecom, and ICT organization or DT process and implementation, since these sectors are considered the cornerstone in any DT process in the sense that if they are ready, all other sectors can follow them.

Methodology: To fulfill the study objectives, the Digital Transformation Frame has been espoused to assess organizations' readiness by shedding the light on four main factors and drivers in this research: the use of technology, value creation, and new

products, organization structure change, and financial aspects. The quantitative approach is used by preparing a questionnaire targeting to assemble data that measure the mentioned factors. The survey sample has targeted top managerial or decision-making levels (Telecom, ISPs, ICT, and Software development) organizations. Furthermore, the quantitative results were validated by using semi-structure interviews approach with expertise in the targeted fields.

Results: The results of statistical tests on collected data have shown that targeted organization are ready to proceed with DT for the four measured drivers. Results have also depicted that 82% of opinions that agreed on using the technology, and create marketing value and new products are main dimensions for apply and implement digital transformation. While 75% of the respondents have agreed that organizational structure and procedure change. Besides, 83.6% of the respondents have agreed that financial aspects constitute the driving force for implementing digital transformation.

Results have also affirmed that there is a difference in respondents' answers regarding the overall organization readiness for DT. Their answers juggle between the organization size based on the number of employees and the availability of IT department in the organization. Furthermore, the results have indicated a strong correlation among all dimensions, also with the main objective of the study since the lowest Spearman's correlation coefficient was (0.833) which is very high positive relation and near to one.

Conclusion: This concludes that Palestinian Telecom and ICT organizations are ready for DT process. On the opposite side, interviews showed many challenges and obstacles related to Palestinian political situation which narrow and limit the expansion in DT process among different sectors.

The outputs of this study can be regarded as a viable option to be used for other academic studies the same topic in Palestine, and may be used as reference for other organizations studies.

Keywords: digital transformation (DT), information and communication technology (ICT), readiness models, digital transformation framework (DTF), value creation, financial aspects, organization structural and procedures.

Chapter One

Introduction

1.1 Introduction

In recent years, there has been a revolutionary growth in digital technologies which was reflected in the whole economic and life aspects [1]. Many organizations now are dealing with new technologies, emerging new competition, and IT-based innovative models. Companies frequently recognize that they must alter and evolve in order to remain relevant in the new digital era; yet, selecting where to begin this process is not easy to them.

Blockbuster and Kodak are famous examples of organizations that left their market-leading positions due to erroneous strategic decisions and poor technological adoption decision-making. Meanwhile, giant firms like Google, Amazon and Apple have thrived and expanded in the market due to their successful management to integrate in the new digital landscape [2].

Although the digital transformation will create viable opportunities for organizations, there are still some challenges impeding the implementation of digital transformation within organizations such as the unavailability or obsolescence of legal and institutional framework, weak infrastructure, resistance to change, low support from the top management in the digital transformation process, lack of trained and skilled employee, financing and cost, and risk to proceed with changes [3].

In the last years, Palestine has experienced noticeable growth in ICT sector and digital infrastructure. According to the figures from the Palestinian Centre Bureau of Statistics, more than 65% of households in Palestine were connected to the internet in 2018 [4]. In addition, more than 37% of households own personal computer (Desktop, laptop, tablet) in 2018 and around 96% of them has at least one mobile phone line, with wide use of smart phones. Meanwhile, some sectors have started their journey into digitalization by focusing on integrating digital technologies in their businesses [3]. For example, in the banking sector, many Palestinian banks have started projects related to digital transform and Fintech. Bank of Palestine, one of the fastest growing banks in the Middle East, has invested in Fintech dramatically, [5].

The Palestinian governmental institutions are currently suffering from a lack of digital infrastructure and interconnectivity across the board. As a result, poor communication between both government establishments and private organizations has led to ineffective services for individuals and businesses, [6].

Although Palestinian national economy has some successful stories in development of ICT services and systems, it is still miles away from Digital Transformation since this requires re-engineering process of the most government and non-government operations, services, and systems through providing high quality service in line with the best industry practices and standards using up-to-date technologies, [7].

The aim of this study is to explore and assess the readiness of Palestinian telecommunication, Internet service providers, and ICT organizations for digital transformation, based on their existing ICT infrastructure and new digital technologies besides exploring how this will affect their business and process.

1.2 Research Problem

The integration and exploitation of new digital technologies is one of the biggest challenges that companies currently encounter. No sector or organization can defy or resist the effects of digital transformation. The effect of digital technologies is often wider than products, business processes, sales channels, and supply chains. However, the entire business models are being reshaped and frequently overturned [8].

Thus, the importance of digital transformation has gone viral in the business world as many organizations have started to integrate digital technologies into their business models [9]. Nevertheless, Business leaders must create and execute digital strategies that drive greater operational performance in order to meet the digital transformation challenge and remain competitive in their sectors. Unfortunately, there have been numerous recent examples of businesses failing to keep up with the new digital reality.

Digital transformation is a complicated subject that impacts many or all aspects of a business. Managers must constantly balance the discovery and exploitation of their companies' resources in order to create organizational agility, which is a prerequisite for effective business transformation. Managers are frequently confused by the various alternatives and factors they must examine in their digital transformation efforts. As a

result, they risk overlooking critical aspects of digital transformation or overlooking solutions that are better suited to a company's specific situation.

Some studies try to deal with digital transformation in organizations. [10] For instance, there is a study that provides some explanation of the effects of digital transformation on organizations in creative industries and addresses the consumers' insights of organizations. Westerman has examined the digital channels and platforms while [11] focusing on the changing relationship between consumers and the organization due to digital technologies. Recent works in academia have been largely concerned with providing guidance on certain aspects of digital transformation; nonetheless, they have not adopted a holistic approach to the development of a company-wide digital transformation strategy, which is required to have successful digital transformation implementation. [12]. The majority of recent research has concentrated on the technology components of digital transformation, while others have emphasized the necessity for organizational reforms to achieve digital transformation. Furthermore, there have been proposals to apply STS theory to a broader spectrum of complicated problems.[13]

The use of a holistic digital transformation framework to assess organizations readiness for digital transformation is essential and crucial for organizations, so they can measure their position against the digital transformation implementation decision.

If we consider the importance of digital transformation, we can conclude that there is no previous academic research conducted to measure the readiness of Palestinian organization to the digital transformation. In this Thesis, we assess and measure the readiness of Palestinian organization that work in telecom, internet service provider, and ICT industry.

1.3 Research Objectives

Undeniably, the literature that tackles the effect of digital transformation on Palestinian organizations and assesses its readiness to digital transformation is very rare. That being said, this research is very important as it aims to identify the position and measure the readiness of telecom and ICT Palestinian organizations against the digital transformation. To fulfill this goal, the study has considered the following objectives:

1. Measure the readiness of Palestinian telecom and ICT organizations for digital transformation.
2. Analyze the Palestinian organizations success and failure factors from digital transformation implementation aspects.
3. Highlight the main reasons for failure digital transformation implementation and suggest solution to overcome this drop.

1.4 Structure of the Thesis

This thesis comprises of six main chapters organized as follows:

- Chapter two includes an overview of the main literature published in this regard. The definition of digital transformation, DT impact on different sectors, and main DT readiness models/frameworks are provided.
- Chapter three discusses the ICT sector in Palestine and its importance to the Palestinian economy.
- Chapter four sheds the light on the research methodology and the digital transformation. Information about the data used in the study provided.
- Chapter five breaks down the research results and processes them thoroughly.
- Chapter six, the result discussed and in chapter seven, the concluding remarks provided with limitations and suggestions for further research.

Chapter Two

Literature Review

2.1 Literature review and theory

This chapter shows the theoretical academic studies that handle the DT. It will add more clarification about the history of DT, definitions of DT, list of readiness models that considered in DT, more details will be explained about the selected DT frame for this study, and lastly, the importance of DT on Telecom, and ICT sectors since they are the selected sector for this study.

2.2 History of DT

In the 1950s, DT's history began with the integration of computer hardware and software [14]. Ten years later, the first mainframes were introduced. At the very beginning, Since the 1960s, various studies have looked into the effects of IT investment and digitalization on businesses [15]. As IT and digital communication technologies merged in the 1980s, DT processes across industries and communities gained public attention [14].

The worldwide growth of the internet in the mid-1990s ushered in a new era of DT, which was followed by the advent of mobile internet in 1998, as well as enormous advancements in hardware, software, services, and new business models [16].

Brynjolfsson claims that 'Second Machine Age,' also known as 'Artificial Intelligence,' (AI) is a new invention age that allows for the employment of smarter machines [17]. Furthermore, Vogelsang emphasizes that a few forerunners in IT innovation and the digital environment paved the way for a slew of technological advancements that defined the information era, which called today as fifth wave [18].

SMAC (social, mobile, analytics, and cloud) technologies are the fifth wave. [19]. Each IT wave is expected to tenfold the number of connected devices, resulting in a minimum of 25 billion mobile instruments by 2020 [20]. SMAC technologies are the most effective digital technology in corporate innovation, according to extant literature, impacting social and economic life equally [21].

After this brief of history for DT, the below section clarifies the differences between some terms that interrelated with DT. This will remove the misconception between DT, digitization, and digitalization.

2.3 General Definitions

Many people has a misconception about the digital transformation and other terms that related to other applications of information technology like digitization (of analog information) and digitalization (of processes) [22]. ‘Digitization’ and ‘digitalization’ are two concepts that are closely associated and often used interchangeably in a broad range of literatures [23]. There is a considerable value in understanding the distinction between these terms before diving into the digital transformation

2.3.1 Digitization

The conversion of analog information to digital (zero and one) which allows the computer to store, process, and send information. Digitization, according to Schallmo and Williams, is the path to moving from analog to digital form. An example of digitization is the process of converting handwritten or typewritten text into a digital format [24].

Likewise, Gassmann defines digitization as “ability to turn existing products or services into digital variants, and thus offer advantages over tangible products”[25]. Digitization however is most often referred to as “ the process of changing from analogue to digital that makes it more feasible to archive, readily access, and share information” [26].

As a result, digitization is described as a technical process of altering and converting analog information into a digital representation throughout this thesis.

2.3.2 Digitalization

In a 1971 piece published in the North American Review, the term "digitalization" was first time used [27]. According to the Oxford English Dictionary (2016), digitization refers to an organization, industry, country, or other entity choosing digital or computer technology [28].

Digitalization is frequently described as a paradigm change that affects both traditional enterprises and entire communities [26]. Brennen and Kreiss describe digitalization in terms of economics as "the acceptance or increased use of digital or computer technology by an organization, industry, or country." Digitalization is defined as "creating products in a digital form, virtually composing and exercising components before manufacturing the product, and maintaining the relationship between a sold or rented product, its users, and the producing company" in the manufacturing industry [29].

Gartner defines digitalization in the business world as "a company's use of digital technologies to modify its business model and move toward a digital business." While, from an organizational standpoint, Digitalization is often referred to as digital technology affecting organizational cultures, business models, infrastructure procedures, and products [30].

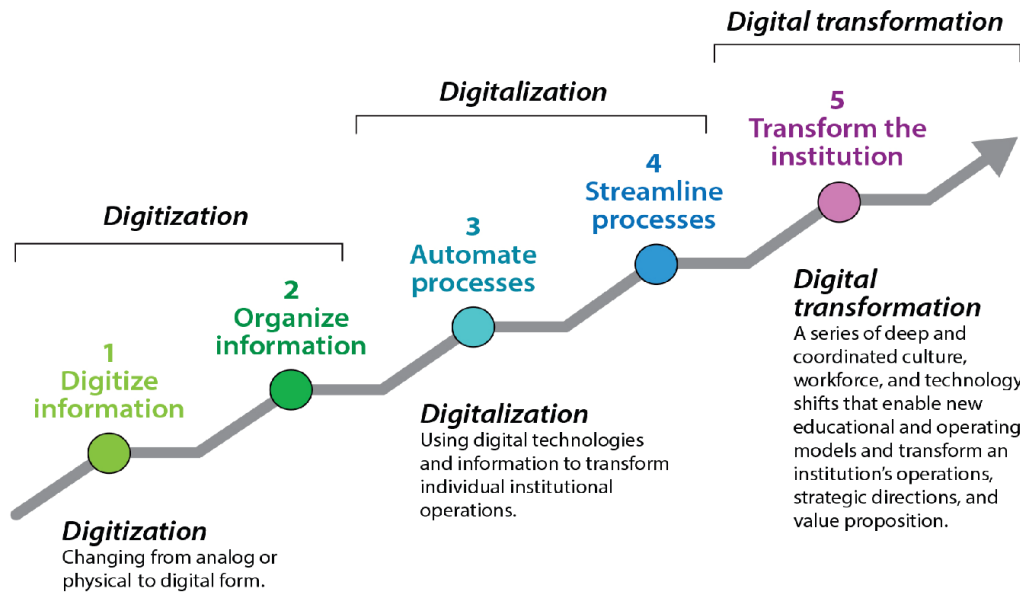
Digitalization, according to the Gartner glossary (2018), is the use of modern digital technology to alter a plan of action and create new income and value-producing opportunities. It's the path to become a digital company. "Digitalization is a perpetual transformation that focuses on discovering new digital solutions for implementing business operations," according to Janowski [31].

SCOOP, a digital business consultant, provides a succinct description of digitalization. "Digitalization" is defined as "the use of digital technologies and data to generate income, improve business, replace/transform business processes (rather than merely digitizing them), and build a digital business environment with digital information at its core." [32]

Digitalization is defined as the process of moving to digital business and transformation, as well as the reorganization of many aspects of social life around digital communication and media infrastructures. As a result, digitalization is defined as "... the integration of digital technology into daily life through the digitization of everything that can be digitized." [33].

Figure 2.1

Digital transformation in context [22]



The aforementioned figure depicts the stages that leads to DT which defined as "A sequence of deep and coordinated cultural, workforce, and technology movements that enable new educational and operating models and restructure an institution's operations, strategic directions, and value offer" [22]. On the other hand, DT definitions differs based on the domain of study, objective from DT, type of applied technologies, and challenges and barriers convert to DT. The following sections highlights many of these definitions, which are considered the bulk of this thesis.

2.4 DT Definitions

Currently There is no overall consensus on accepted definition for the DT, consider that DT term is interchangeable with the terms like digitalization and the digitization as explained in previous section a universal definition has not yet been established. From an economic and business perspective, Lucas defines the DT as “fundamentally transforming old ways of conducting business by redefining corporate capabilities, processes, and connections” [34]. DT is defined by several researchers as developments in digital technology that affect human environments as well as organizational settings [11]. Based on DT's technological perspective, Liu emphasizes "the integration of digital technology into business operations" [35]. Furthermore, the technical part of DT

is described by Schuchmann as the “realignment of technology to interact digital customers more efficiently at every touch point throughout the customer experience lifecycle”. [36]

From an organizational standpoint, Bharadwaj DT described as "an organizational strategy designed and executed by using digital resources to produce differential value" [21]. Furthermore, Mithas and Westerman highlight the importance of DT's IT engagement in improving organizational performance [37]. Hess, Benalin, Matt, and Wiesböck are also "concerned about the changes digital technology can bring about in a company's business model, such as changing products, organizational structures, or process automation." [38]

BMWi States, "Digitization refers to the entire interconnection of all sectors of the economy and society, as well as the ability to gather, analyze, and translate important data into actions. Changes provide benefits and possibilities, but they often present entirely new obstacles." [39]

Digital Business Transformation (DBT) is defined by Bowersox as “The process of reinventing a company in order to digitize operations and establish wider supply chain links. The DBT leadership challenge is about reenergizing firms that are already successful in order to fully use the potential of information technology throughout the entire supply chain”. [40]

According to Westerman DT is becoming a hot topic for businesses all around the world. Executives across all industries are transforming customer connections, internal processes, and value propositions by leveraging digital innovations like analytics, mobility, social media, and smart embedded devices, as well as optimizing their use of older technology like ERP.[9]

Based on Mazzone, digital transformation is the strategic and tactical digital evolution of a firm, business model, idea process, or methodology. [41].

Fitzgerald defines digital technologies (DT) as the application of emerging digital technologies, such as social media, mobile, analytics, or embedded devices, to enable big business benefits such as improving customer experience, optimizing operations, or generating new business models [42]. McDonald makes a business connection between

the DT and revenue claiming that Digital Transformation goes beyond simply digitizing resources, resulting in the creation of value and money from digital assets. [43]

Stolterman defines DT as the changes that digital technology causes or impacts in all facets of human life .[44]

Martin argues that DT increasingly often characterized as the use of information and communication technology to generate fundamentally new capacities in business, government, and people's and society's lives, rather than simple automation. [45]

Hess defined the DT as the changes in a company's business model that digital technologies can bring about, such as new products, organizational structures, or process automation. [46].

The conceptualized definition of digital transformation, according to Vial, is, a method for improving an entity by causing major changes in its attributes by combining information, computation, communication, and connectivity technologies [47].

Lee Congdon, CIO of Red Hat Linux corporations, (2015) defined the DT as The integration of digital technology into all elements of a business, radically changing how you operate and give value to clients.

Because digital transformation has varied meanings in different firms and even within the same business, coming up with an unifying definition is difficult. So, based on the literature, in our study will define digital transformation of a company as the integration of digital technology into all areas of business (organization, manufacturing, etc.) that can result in major changes to how organizations function and give value to their consumers. It also necessitates employee acceptance of the fact that frequent changes in operations and duties are unavoidable. [16].

Once company has been digitally transformed or has set the bases to adopt new technologies depending on the market requirements, it inevitably has to be prepared for failure as the transitional period brings many challenges for all organizations that attempt it but also benefits to the ones that succeed [9].

However, in order to avoid the risk of failing due to digital transformation implementation, organizations must identify their position against the digital

transformation implementation. This achieved by apply the digital transformation readiness assessment on the organizations based on holistic digital transformation framework. The following section will highlight about major readiness models used for assess the DT.

2.5 Readiness Models and Frameworks for DT

As introduced, the digital transformation is a holistic term that affect all levels in organization. Thus, measuring the readiness of organization to implement successful digital transformation becomes a crucial factor. Lezina presents different approaches to assessing organizations' readiness for digital transformation which are listed in below table.[48].

Table 2.1*Framework/models of readiness for digital transformation.*

Framework/Model name	Institution/Source	Assessment approach
The five digital business aptitude domains	KPMG	Suggested domains: vision & strategy, digital talent, digital first processes, sourcing and infrastructure, governance
The Digital Maturity Model 4.0.	Forrester/Gill and VanBoskirk	Four dimensions determine digital maturity: culture, organization, technology, insights
Digital Acceleration Index	BCG	The 4 building blocks evaluated: business strategy driven by digital, digitize the core, new digital growth, enablers
Industry 4.0 Maturity Model	Schumacher, Eiril, Sihh	62 maturity items which are grouped into nine dimensions: strategy, leadership, customers, products, operation, culture, people, governance, technology
Digital Assessment Maturity model	De Carolis, etc.	Evaluation the maturity indexes of company's process area: design and engineering; production management; quality management; maintenance management; logistics management
Digital Services Capability Model	Wulf, Mettler, Brenner	17 capabilities of digital transformation in eight classes: consumers, services, processes and activities, organization, information, technologies and infrastructure, strategies, environment
Organizations digital readiness framework	Sánchez, Zuntini	External and internal analysis including: ecosystem collaboration, five forces analysis, resources and capabilities, value chain analysis, initial conditions, barriers
Interrelationship between the digital transformation, strategy and organizational capability	Schumann, Tittmann	Assessment in three dimensions: digital transformation, digital business strategy, organizational capability
Digital transformation framework	Matt, Hess, Benlian	The four different dimensions: use of technologies, changes in value creation, structural changes, financial aspects

Table (2.1) shows that some of the assessment approaches have a large number of assessment factors like (Industry 4.0 Maturity Model), and (Digital Services Capability Model) which is difficult to apply them on study and needs more time. The (Digital REadiness Assessment MaturitY model) approach concerns on how to measure the engineering processes, and how to manage it. This is out of the study scope. The remaining approaches have common assessment factors, which are related to technology, organization, and business strategy and value.

Using a holistic digital transformation framework to achieve the goal of the study by assessing organizations readiness for digital transformation is essential and crucial for organizations, so they can measure their position against the readiness for digital transformation implementation. The *Digital Transformation Framework* (DTF) prepared by Matt and Hess represents a first step in this direction. This conceptual framework for measure the readiness of digital transformation process within organization.[49] The framework identifies the four key dimensions and common elements of every digital transformation endeavor as, use of technologies, changes in value creation, structural changes, and financial aspects [49], the following section provide more details about the frame and its main dimensions.

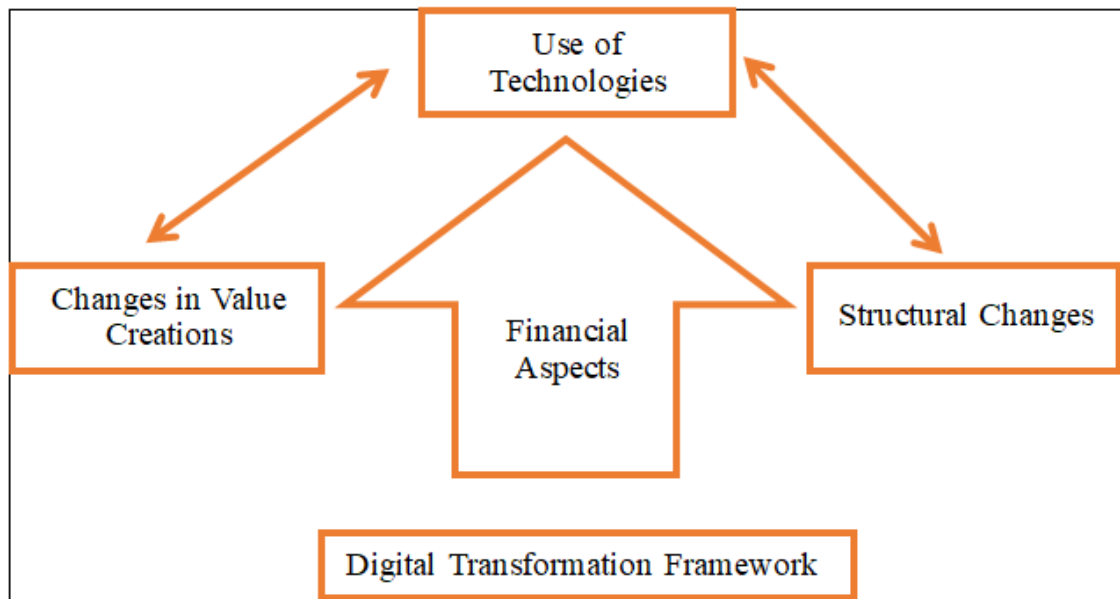
2.6 Digital Transformation Framework (DTF)

Formulating a digital transformation process as a fundamental concept to combine the complete coordination, prioritization, and implementation of digital changes within a corporation is an important strategy. The potential benefits of digitization are numerous, including increased sales or productivity, value creation innovations, and unique consumer interactions, among others. This leads that whole business models might be formulated and reshaped [8].

The digital transformation framework takes a different approach and has different objectives. They focus on the transformation of products, processes, and organizational characteristics as a result of new technology from a business standpoint. Figure (2.1) depicts the interdependencies between the various dimensions as part of the Digital Transformation Framework (DTF), which assists businesses in assessing their current capabilities and developing a digital transformation strategy.

Figure 2.2

Digital transformation frame [49]



Dimensions of the Digital Transformation Framework (DTF) are used to create guidance for businesses in the form of questions to assess their readiness for digital transformation. List the important issues concerning digital transformation that management must address for each dimension, as well as a range of solutions from which management can choose when they respond to the questions. In combination, these answers and feedback on questions cover all relevant aspects of assessment of organization readiness for digital transformation process. The following sections show more details about each dimension and highlight its importance in DT readiness process.

2.6.1 Use of Technologies Dimension

The introduction of digital technologies is driving digital transformation. As a result, how a corporation uses new digital technology is an important aspect of its digital transformation preparedness. Emerging digital technologies can provide businesses with new prospects and may be critical to gaining a competitive advantage. Nonetheless, the importance of IT and its strategic function differs greatly between businesses.[49]

Some businesses see IT as a catalyst for new business opportunities. Others, on the other hand, employed IT to support and improve established business requirements. Thus, in some companies, a new digital technology is the primary driver of change, whereas in others, other business challenges drive the change process, and an appropriate technology to enable the change must be identified.[50]

Companies can approach the process of disseminating new digital technologies in a variety of ways, regardless of the role of IT. Firms that are more conservative may use well-known technology solutions, while others may use innovative technology solutions that are still in the early stages of development. Acting as an innovator and creating and introducing new technology solutions into markets is a more aggressive approach.[51]

The examples show that a company's digital technology ambitions are mostly driven by its own circumstances. Firms should examine their existing technological skill, the extent of their technology spending, and their size when determining where they should ideally be on the technology ambition spectrum.[38]

Part of organization readiness for DT is to use of technologies include how it's used to facilitate the cross-functional cooperation within company, investment on new technologies and develop existing one, and follow standards and regulations of data and IT security.

2.6.2 Changes in Value Creation Dimension

Changes in value production are frequently associated with the adoption of new technology. These considerations have an impact on a company's digital transformation readiness, or how much new digital operations stray from the traditional core business. On the other hand, Further deviations provide chances to expand and enrich the current product and service portfolio; yet, they are frequently accompanied by a greater demand for alternative technology and product-related competences, as well as increased risks due to the new field's lack of expertise. Digital technologies modify a company's business model, resulting in changes in value production.[49]

Rather than merely converting formerly analog products and services to the digital world, many businesses want or need to take use of digital technology's capabilities and expand into new markets. Managers must assess how far their company should diversify

its operations into the digital realm. Finding new revenue streams is critical for future business success and is therefore an essential component of digital transformation readiness. Companies should be prepared to recognize how they may create value and so generate income when building new digital products and services. [38]

Organizations should consider smart products, which come as a result of the integration of physical things with digital advances such as mobile apps and sensor technology. In addition, Smart services that are based on or facilitated by digital technologies can help businesses widen their value propositions. New solutions that extend existing service offerings, digital services that enhance physical products, and hybrid product-service bundles are all examples of such services. IT is an inherent aspect of the product in this regard.[26]

Moreover, The current tendency of individualization opens up new possibilities for creative value offerings. Customers want products that are personally personalized or self-designed to meet their own needs. As a result of this, Companies should offer customizable products or product pieces by involving existing consumers in the design process (e.g., bespoke banking products) or by providing personalized services based on customer analytics (e.g., individual book recommendations). This is enabled via new digital manufacturing technologies that allow for tiny batch sizes or newly generated, acquired, and analyzed customer data enable this (e.g., demographics, preferences, product or service use patterns, online activities).[52]

2.6.3 Structural Changes Dimension

The organizational structures of a corporation are affected by digital transformation, just like any other sort of transformation. The Digital Transformation Framework's structural dimension is concerned with who will be in control of the transformation effort. The readiness of many firms to embrace digital transformation is determined by two factors: top management support and the commitment of key staff within organization to the strategy. [49]

Because digital transformation can completely disrupt a company's business model, one of the most pressing concerns for executives is where to place new digital business operations within the organization. They must determine whether to include new

operations into existing departments or to structure them as separate, unique entities (perhaps as a newly formed subsidiary). Both options will have benefits and drawbacks. Integration within the existing business structure usually necessitates less reorganization initiatives. If close collaboration between conventional and new digital businesses is required, the integration strategy may be preferable. In this context, it's critical to see if there are any synergies that may be leveraged between traditional domains and new digital activity. In contrast, organizing new digital activities in separate structures and entity makes it easier for companies to expressly segregate their old and new operations (physically and ideologically). They can also create appropriate structures for new digital operations from the ground up, which are often more innovative and allow greater flexibility. [38]

Different types of operational modifications are required for digital transformation readiness. To begin with, new technologies have the potential to drastically alter the current products and services offered to clients. These modifications can apply to both finished products and any pre-products required to provide the final result. Second, digital technologies can help businesses change their procedures. Business processes can be categorised as operational, support, or managerial, however operational processes are typically the focus of digital transformation activities. Digital technology, for example, might speed up the execution of business processes, involve different skills, necessitate different resources, or completely automate some tasks. As a result, a company must completely identify its processes and determine which of them may be impacted by digital transformation activities, as well as the potential consequences. In a digitally transformed business, the essential changes in products, services, and business processes, as well as the continuous operations, are more likely to necessitate new talents. Organizations must carefully evaluate their current technological capabilities and determine the new skills that will be required.[53]

The optimal solution will be largely determined by the firm's existing competencies and financial resources, as well as the planned timeframe for digital efforts. The first alternative is for businesses to expand on their existing capabilities and acquire the necessary skills on their own (e.g., by either training current staff or hiring new employees). This method, however, usually takes time. As a result, collaborating with other organizations that may already have specific skills to assist integration processes

is another alternative. This method lowers the chances of failure. If the jointly shared activities are of critical strategic importance, acquiring the partner company may be a viable alternative for keeping the shared resources and knowledge in-house. [38]

Outsourcing the technology procedures required for digital transformation is another alternative if they are well-structured and not unduly complex. Both partnership and outsourcing alternatives can have advantages in terms of reduced initial investments and risk distribution as compared to building the requisite competences domestically. However, the disadvantage of these two methods is that they raise the danger of losing a required expertise as well as becoming reliant on a third party. By keeping the procedures and expertise necessary for digital transformation in-house, a company can gain a competitive advantage from future digital transformation activities. [38]

2.6.4 Financial Aspects Dimension

An important part of digital transformation efforts is the financial dimension of digital transformation preparedness. Increasing financial strain on the current core business could be the catalyst that convinces management that action is required. To carry out transformative activities, the organization's financial readiness will be required.[49]

Top management's willingness to put in the necessary work and accept the associated risks of digital transformation initiatives is frequently determined by the viability of the current core business. Managers may not recognize the need for digital transformation activities or be ready to incur the risks if the company's present core business continues to generate sufficient revenues.[54]

Markets, on the other hand, can shift quickly, and acting too late can be disastrous for businesses. Rather than waiting for the projected tectonic shifts in the way revenues are made in their industries, companies should take digital transformation seriously and address its possible implications and take appropriate precautions right away. [49]

DT is used by an organization to maximize value creation, future revenues, and profits. Firms can choose between internal and external financing solutions to fund their digital transformation projects. The financial viability of a transformation project is determined by the existing state of the company and its future possibilities. Any investor must believe that the digital transformation will benefit the company and that their

investments will eventually pay off. As a result, if a company is already in financial distress, its alternatives for funding digital reforms will be severely limited. [38]

Since this study is concerned with measuring the readiness of DT for Telecom and ICT sectors, the following section will highlight the spots on how important DT is for them and the need to move on with DT implementation.

2.7 Digital Transformation in Telecom Service providers and ICT Sectors

Telecommunication and ICT industries similar to other industries are facing pressing changes related to digital transformation. Both sectors suffer from serious hiccups due to DT and new players in the sectors leads them, who are working hard to modify their business approach to get maximum benefit from DT.[55]

2.7.1 Telecom Service providers Sector:

The disruption of DT affects the traditional communication services such as SMS, and Voice, and force the service providers to use latest technologies like 4G-LTE, messaging services such as (WhatsApp, Facebook, and Skype), and on the top like Netflix streaming and Video on demand. (Westerman et al., 2011).

Many drivers and factors support the telecom service providers to consider the digital transformation in their strategies:

- Developed technologies make everything connected to the internet and required service provider network infrastructure to make this connectivity stable example the connected vehicles.
- New players such as Google, Apple, Facebook, and Microsoft which offering new digitize services and products and their service move to cloud which force telecom service providers to have direct connectivity with them to offer acceptable quality of experience for end consumer.
- Customer expectation is changed as his social lifestyle become highly depends on internet connectivity to digitize services. [56]

- Traditional services revenue declining which affects the financial position of telecom service providers. (Kendall, 2014).

Telecom service providers need to overcome these challenges and get benefit from new opportunities by have their own digital strategy. This achieved by built network connectivity infrastructure to serve future demands, and create new products and value for their customers in line with new global platforms. All of this has to be within proper time and with acceptable cost.

2.7.2 ICT and Software Developing Sectors:

Fundamentally, the ICT and software systems are considered the main corner in the digital transformation for other industries and sectors. They still face technical and organizational challenges due to digital transformation that listed below and it should be taken in consideration to get the ability to compete with other competitors and stay in the market. [57]

1. Reduced Time-To-Market

New innovations, products, and features for existing products are expected by the customers to be available as soon as possible [58]. Thus, the time to market has to be reduced. On top of that, ICT companies have to enhance and modify their internal process in way that allows deploying new functionality continuously.

2. New Disciplines, Devices, and technologies

Big Data, IoT, Industry 4.0, and Machine Learning are all difficult issues that can be used to produce competitive goods. Customers also use new gadgets such as mobile phones, virtual reality glasses, smart watches, and all of the intelligent devices in a smart home. [59]. All of this compelled ICT firms to grasp these concepts and products in order to create new opportunities and remain competitive in the market [58].

3. Consumer-/ Customer-Oriented

Berman believes that the ability to improve products and services improves the consumer experience [60]. Furthermore, Leimeister et al. stress the importance of

developing consumer-oriented solutions. [61]. ICT companies must place a greater emphasis on end-user goods than in the past.

4. Combination with Legacy IT

The rapid speed with which new gadgets and technologies emerge causes existing IT to age more quickly [59]. The existing IT, especially in mature landscapes such as those found in larger firms, cannot be updated quickly. As a result, ICT organizations must consider where the supplied solutions will be implemented and be prepared for a rigorous integration and deployment process to integrate new and modern systems with legacy IT.

As a result of the aforementioned challenges, ICT and software developing companies must adapt to the changes caused by Digital transformation overall organization levels which includes strategy, organizational structure, implemented technologies, and new products and services.

In the forthcoming chapter, the Palestinian ICT will introduced by shedding light on the ICT position in Palestine, penetration of ICT within Palestinian society, raised the main challenges that impact the growth in ICT sector, and lastly combine it with digital transformation.

Chapter Three

Telecom & ICT sectors in Palestine

3.1 Palestinian ICT Infrastructure

“The Palestinian ICT sector is gaining more and more recognition both within the Palestinian Territory and around the rest of the world. For a small economy with a young and well-educated population, this sector has the potential to make a strong contribution to balanced sustainable growth. In recent years, there has been an increase in the number of companies, as well as inward investment from international names such as Cisco and Intel. This special feature documents this growth, and considers what factors might need to be addressed to help the sector deliver its potential.” [62].

The importance of ICT draws the developing countries’ attention to building of the capacity of ICT sectors and utilization of its products in different areas in order to develop and enhance their economy.

In the early 1980s, Palestine’s ICT focuses on hardware retailing and wholesale of computers and electronics. However, after Oslo Accord was signed and the Palestinian National Authority was established, the demand for ICT products and services increased especially by the Palestinian Authority’s institutions, local municipalities, the private sector and the utility companies. The demand was mainly for provision of software solutions such as accounting solutions [63].

In 1997, the Palestinian Telecommunications Company (Paltel) started its operations in the Palestinian market as a fixed line operator. Paltel signed with the Palestinian National Authority two exclusive licenses to develop the telecoms sector. The first was a 10-year exclusive license for the fixed line and the second was a 5-year license for the cellular phone. [64]

This agreement allowed Paltel to invest in the West Bank and the Gaza Strip telecoms infrastructure. A large digital network was installed, offering different services such as voice, internet, and VPN for corporate business services. [65]

In 1999, the first mobile operator Jawwal was established with 65% stake for Paltel. In 2003, Paltel got full ownership of Jawwal, offering mobile services and providing

internet using the Second Generation (2G) Global System for Mobile Communications (GSM), and the Enhanced Data Rates for GSM Evolution (EDGE) technology. [64]

In 1999, owing to the ICT sector's growth, and the increasing number of ICT companies, PITA was established. Its objectives were to work as the ICT ambassador for Palestine globally, set up a command position for the Palestinian ICT industry, become the main representative of the ICT sector in Palestine, and encourage innovation and support building a Palestinian knowledge-based economy [66].

The Palestinian telecoms market was known for its monopoly status until 2006 when the Palestinian government ended the exclusivity of mobile license and opened the mobile and internet market for competition, promoting fair competition and liberal environment, allowing more services with affordable prices for customers from both the existing operator and the newly licensed one. In 2009, a second mobile operator, Wataniya Mobile, entered the market with \$354-million license fee, after a delay period of two years and a half waiting for the Israeli approval to get the required frequency to start its operations [64].

In 2010, Palestinian MTIT break the monopoly of providing internet services by open the market to many Internet Service Providers (ISPs) and Voice over Internet Protocol (VOIP) providers to operate in the market, offering different services over the internet at competitive prices. As a result there has been an increase in demand for these kinds of services and for the development of ICT infrastructure including the mobile and the digital network for the internet [67].

In 2018, the ICT sector took a major step forward with the launch of 3G services in the West Bank and with the introduction of Ooredoo (Mobile Company) phone and data service in Gaza. [64]

Nowadays the services offered by the ICT companies in Palestine range from telecommunications and software industry products (finance and accounting, human resource management and management information systems) to web products (web development, e-businesses and ICT consultancy) and mobile phone applications and animations.

3.2 ICT Penetration in Palestinian Society

The Household Survey about the results of Information and Communications Technology prepared by Palestinian Central Bureau of Statistics (PCBS) in 2019 showed that 33% of the households own a computer (desktop, laptop, or tablet) in Palestine. By the same token, the percentage of individuals (10 years and above) who used the computer from any location was 26% in Palestine.[68]

According to MTIT, there was an increase in the mobile cellular subscriptions by the end of 2020, reaching 4.3 million subscribers in Palestine compared to 2.6 million at the end of 2010, with 64%. In return, this is reflected in the mobile penetration rate per 100 persons that reached 83 mobiles at the end of 2020 compared to 64 mobiles at the end of 2010 [69], while in UAE the mobile penetration reached to 186.1 mobiles per hundred subscriptions on December 2020.

In addition, the data of the Household Survey on Information and Communications Technology, 2019 showed that 97% of the households in Palestine have at least one or more cellular mobile lines. The results also showed that the percentage of households with one Smartphone or more was 86% in Palestine. [68]

Data from the Ministry of Telecom and Information Technology indicated that there had been an expansion in the fixed network infrastructure, accompanied by increased use by households and institutions of this network and related services, especially the internet service. The number of landlines reached 466,283 telephone lines (Home, Commercial, Governmental) in Palestine at the end of 2020 compared with 360,402 lines at the end of 2010, with an increase of 29%. [69]

In addition, the total number of ADSL subscribers in Palestine increased to about 373 thousand subscribers by the end of 2020 compared with 119 thousand subscribers by the end of 2010, with an increase of 213%. The average internet speed was 13.5 Mbps at the end of 2020 compared with 0.5 Mbps at the end of 2010.

Based on above the Household Survey results on Information and Communications Technology, 2019 showed that 80% of the households in Palestine have internet access in 2019. Moreover, the percentage of individuals (18 years and above) who used the

internet from anywhere reached 72% in Palestine (76% in the West Bank and 67% in the Gaza Strip). [68]

3.3 Palestinian ICT influence on Economy

According to PITA, today the ICT sector is increasingly competitive and plays an increasingly important role in the Palestinian economy, accounting for 8% of the gross domestic product (GDP) with expected growth to 10% of GDP, and contributing \$530 million in annual value-add to the economy. [63]

There are 250 ICT companies with 5000 direct employees and 15000 indirect employees. Workers in the ICT sector are significantly more productive than workers in other sectors. Even though ICT workers comprise 3% of the total workforce, they account for more than 8% of GDP. [63]

50% of Palestine ICT companies have partnerships outside Palestine and they built partnerships with major multinational companies such as Intel, Microsoft, HP, and Cisco. What is more, 30% of the companies are exporting services and products to international markets include USA, Europe, Middle East, and Arab Gulf. [63]

3.4 COVID-19 Pandemic impact on Palestinian ICT Sector

The COVID-19 Pandemic highlighted the crucial role of technology necessary to ensure the continued functioning of societies in different fields. This leads all countries to take advantage of information and communication technology to develop digital policy strategies to respond effectively to challenging times.

Data of the Population, Housing and Establishments Census, 2017 indicated that the number of establishments working in the ICT sector accounted for 1,008 establishments out of the total economic operating establishments of (158,573).[70]

The COVID-19 Business Pulse Survey results in Palestine during the period (5/3/2020–31/5/2020) indicated that 90% of information and communication sector establishments reported that the sales/production size has decreased during the three months of the lockdown by 54% when compared with the normal situation. The results also indicated that 69% of the operating establishments in the information and communication sector were closed for many days due to the restriction measures taken by the government

during the mentioned period. The COVID-19 Pandemic cast its shadow on the information and communication sector and decreased the average sales/production of more than half during the closure period compared to the normal situation.[71]

On the opposite side, the use of Digital Solutions has been a lifeline for establishments during the Pandemic. The COVID-19 Business Pulse Survey results in Palestine during the period (5/3/2020 – 31/5/2020) indicated that 13% of the establishments started using or have increased the use of the internet online social media networks, specialized apps, or digital platforms in response to the COVID-19 outbreak. In comparison, the primary use of such digital solutions was for marketing with 69%, 53% for business administration, and 40% for service delivery. During three months (88 days), starting from March 5th until May 31st, 2020, establishments reported that the percentage of employees who were working remotely from home was 6% of the total number of employees; mainly in the telecommunication sector (18% of the total number of employees) and construction sector (8% of the total number of employees). The main results also showed that the highest percentage of employees working remotely from home was among large establishments with a rate of (12%). [71]

The results of the Impact of COVID-19 Pandemic (Corona virus) on the Socio-economic Conditions of Palestinian Households Survey during the period (23/8/2020–31/12/2020) indicated that 84% of households that have children in the age of (4-18) years in Palestine, their children participated in educational activities (online education) during that period; (81% in the West Bank and 87% in the Gaza Strip). [71]

While 46% of households whose children did not participate in online education activities indicated that the lack of a computer (laptop, desktop, or tablet) at home or even its insufficient availability prevented their children from participating in online educational activities during the mentioned period (43% in the West Bank and 52% in the Gaza Strip). [71]

In addition, 50% of the households whose children did not participate in online education activities indicated that the lack of internet access at home or its insufficient availability prevented their children from participating in online educational activities during the mentioned period (44% in the West Bank and 60% in the Gaza Strip). [71]

3.5 Challenges Impact the Palestinian ICT Sector

Since the Israeli occupation of the Palestinian territories in 1967, Israel took complete control of the ICT infrastructure and sector in the West Bank and Gaza, impeding development and blocking the establishment of an independent network, instead making Palestinians entirely dependent on the Israeli occupation authorities. In defiance of the Oslo Accords, which stipulate that Israel must gradually transfer control over the ICT sector to the Palestinians, Israel has tightened its control over the Palestinian ICT infrastructure, resulting in severe violations of Palestinian digital rights. [72]

Due to restrictions and policies forced by the Israelis, telecommunication operators, Internet Service Providers and ICT companies continue to have difficulty in building telecom networks in Area C, acquiring the needed frequencies for existing wireless networks and importing needed equipment. All of the mentioned issues are considered main constraints that impede ICT firms' growth in Palestine. The political situation that limits the ability to travel and move goods and services, which causes the need for technology to have virtual communications. [69]

In addition, Israel refused to provide 3G services in Gaza strip for Palestinian mobile companies which is recently launched in West Bank. Meanwhile, 4G takes the lead in 2019, while 5G moves from trials to early commercialization in China, the US and Japan. This provides advantage to Israeli mobile providers to operate in Palestinian areas without any restrictions or licenses. [69]

The ICT sector in Palestine still suffers from numerous local challenges that need to be overcome such as lack of ICT penetration in businesses, education & government, the absence of coordination between private and public sector groups, the limited access to foreign and international markets, the lack of innovation and creativity in product and service development, the weaknesses in the legal and regulatory framework. In addition, to the gap between the skills that ICT students receive at schools and universities with the labor market needs and requirements.

3.6 Palestine and Digital Transformation

Investing in the digital economy is more important than ever to mitigate the impact of the accumulating crises. The pandemic has forced Palestinians to isolate and government facilities to shut down at a time when families most need public services. In the absence of reliable internet connectivity and a citizen-centric e-government platform, many citizens and businesses have found it increasingly difficult to access essential information and services.

Digital solutions have already played an important role in maintaining economic and social continuity, the public and private sectors have encouraged employees to work from home, used social media to keep citizens informed, and even introduced home-based learning to some schools. [73]

However, this rapid transformation to digitization has increased inequalities between those with connection to the internet and those without. People and businesses in remote areas are particularly disadvantaged, and municipal government buildings often lack internet connectivity themselves. On March 26, following a year of analytical work and discussions with the Ministry of Telecommunications and Information Technology (MTIT), the World Bank approved a \$20-million grant to support the Palestinian territories' transition to the digital economy. The "Digital West Bank and Gaza" project will assist the PA in accelerating digital transformation under an ecosystem approach, targeting several areas of the digital economy simultaneously in order to maximize impact. [74]

From an institutional perspective, the project will support the MTIT in setting up the necessary regulatory environment to facilitate the development of the digital sector. The design of a Public Key Infrastructure (PKI) and certificate authority (CA) for e-signatures will allow for the introduction of a range of digital transactions. An emergency response center will be established to bring together all emergency response services and utilize modern communications systems to coordinate emergency dispatches. [75]

Focusing on the telecom sector, the engagement will support the creation of an independent regulatory body for the sake of promoting competition and transparency. Support will be directed towards increasing access to high-speed internet by expanding the PA's fiber-optic infrastructure and by funding the purchase of bandwidth for public facilities in remote areas, improving local government service provision in the process. [76]

The World Bank will also assist the PA in embracing a whole-of-government approach to e-service delivery, including the development of a national e-government strategy, enterprise architecture, and a modern e-procurement system. This will be followed up with the introduction of impactful government-to-citizen (G2C) e-services that will be accessible to the public through an online portal, helping launch a process of digitalization across the PA that can span various sectors, from water and energy to education and skills. [75]

Ultimately, the World Bank's engagement aims to unleash the development of a digital economy in the Palestinian territories at a critical time. Digital solutions will help Palestinians to maximize their opportunities in an environment where their movement is restricted and in-person transactions are increasingly limited; an integrated and technology-enabled emergency response unit will facilitate rapid, data-driven responses to a range of incidents, and potentially save lives. [73]

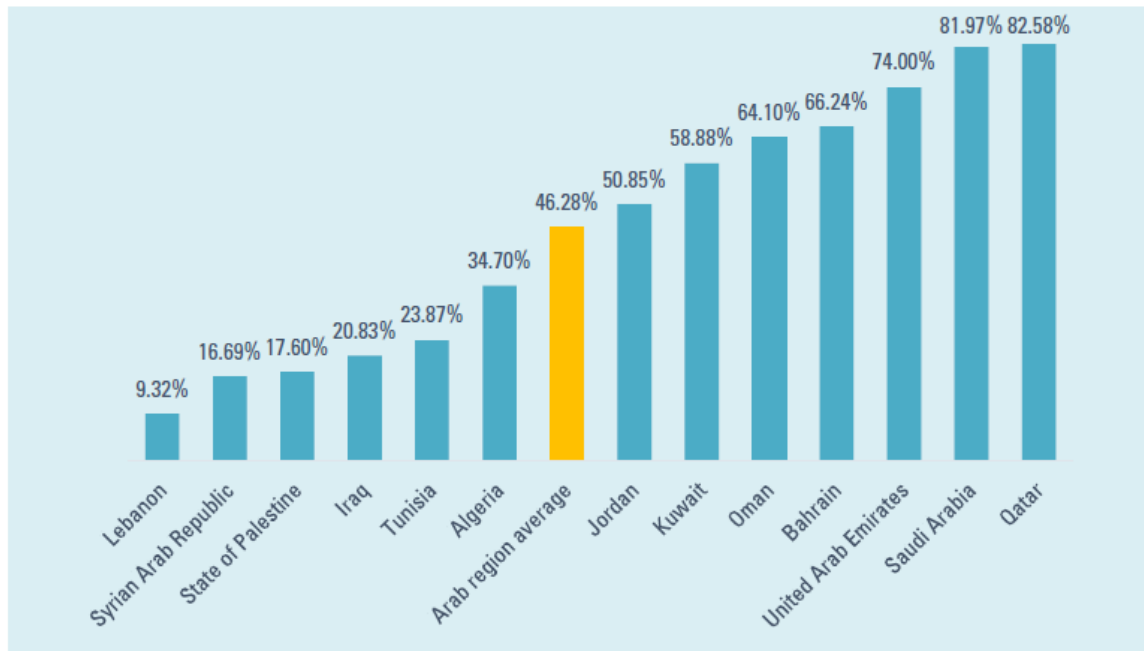
Until restrictions on infrastructure, movement, and broadband spectrum are lifted, it will be difficult to realize the full potential of the Palestinian economy. However, by investing in digital transformation, the Palestinian territories will be well-equipped to deal with the current and future crises and will open the door to numerous opportunities of growth, particularly for young graduates and entrepreneurs.

3.7 Palestine DT compare to Arab Countries

ESCWA report published in December 2021 for measuring the government electronic and mobile services (GEMS) shows that Palestine located on 11th position out of 13 countries participate in the study as shown in figure (3.1). [77]

Figure 3.1

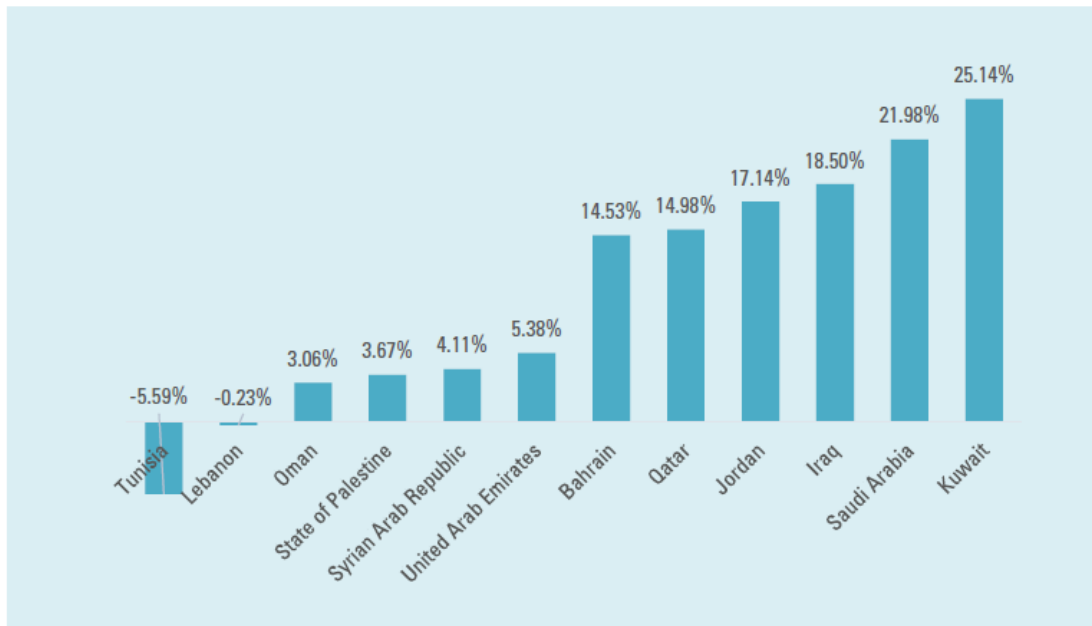
Overall score in GEMS 2021 Source: ESCWA calculations



However, there is progress about the development of government services and DT of 2021 compared with 2020. Even all countries suffered from COVID-19 that forced the world to depend on technology and remote services, but the report shows weak improvement in Palestine to depend on e-services. The report represents that 3.67% is the progress in e-service in 2021 compared to 2020 in Palestine, which is an indication of slow improvement in DT compared to other Arab countries as shown in the below figure (3.2).

Figure 3.2

Changes in GEMS values between 2020 and 2021 Source: ESCWA calculations



Above reports highlight the huge gap between Palestine and other Arab countries in term of digital transformation. So, this study helps to assess the readiness of ICT sector for DT and other enablers that can help to bridge this gap.

Chapter Four

Methodology

4.1 Methodology

A thorough knowledge of the organization's level of digitization is an important first step toward a successful digital transformation. They should utilize this knowledge to explore possible methods within the company for digital technologies to effect and maybe use to produce beneficial prospects for the organization once they have a sufficient awareness of their level of digital readiness.

The Methodology chapter describes methods used in this study, in particular, the chapter explains the research approach being used, the literature review process, continues with the data collection and data analysis methods, and concludes with the quality of research.

4.2 Study Methodology

The methodology used in this study adopts the mixed approach that consists of quantitative and qualitative approaches:

4.2.1 Quantitative Approach

It is considered one of the analysis forms, and organized exploratory to describe a phenomenon. To fulfill the study objective which is assessing the readiness of Palestinian Telecom and ICT organizations for DT, the data collected from the survey forms was statistically analyzed using SPSS. Descriptive statistics, reliability analysis, normality testing, and a non-parametric methodology using the Kruskal-Wallis test, Mann-Whitney test, Spearman correlation test were utilized as techniques. Lastly, it highlights the statistical processes in data analysis that leads for the results.

In this research, two sources were used to collect the data, which summarized below:

1. Primary Source: This is achieved by designing a questionnaire that contains four dimensions. Each of each is listed in the literature review, in order to assess and measure the DT readiness in Palestinian Telecom and ICT organization.

2. Secondary Sources: it is based on books and previous scientific articles related to DT topic and concern about its readiness within organizations. In addition, data collected from national ministry and establishments like MTIT and PCSB.

4.2.2 Qualitative Approach

Since this study does not create a new framework to assess and measure the readiness of DT, and it depends on well known and published framework. In order to validate the quantitative results of the survey, and to reflect the especial situation of Palestine state under the Israeli occupation. This can be achieved using the qualitative approach by conducting semi-structure interviews with experts in the ICT sectors which handle top management levels in their organizations.

Selected Experts work in sectors that targeted in survey sample, such as Telecom companies (Fixed, Mobile, and ISP), ICT, Software development, and external consultant work with MTIT in DT project. Refer to interview section for more details about interviewers.

Interviews were open discussion measuring their understanding about DT, how their organization works to achieve DT, and what is the major enablers and challenges they faced in DT journey.

4.3 Study Population and Sample

The population of study consists from the Telecom, local internet service providers (ISPs), ICT, and software developing companies that legally registered in Palestine. Since the objective of study is to explore their organization readiness for DT implementation. According to that, 75 questionnaires were distributed to targeted positions which they have full knowledge about companies' strategies and they can take a decision regarding digital transformation, while 61 responses were collected with response rate around 81.3%, which consider enough to this study.

4.4 Research Instrument

Specialized questionnaire was designed to explore and assess the readiness of Palestinian Telecom and ICT organization for DT implementation. It contained from five main parts, the first one will have general information about the organizations and

the other four main parts measure the four dimensions that concluded from digital transformation frame that explained in the literature review.

The first part contains from four questions that asking about in which sector the organization is working, size of organization in terms of employee, areas that organization offer its services, and the availability of IT department within the organization. Also, the position of respondent was requested.

The second part contains from (7) items that measuring the readiness of organization for DT based on use of technology and existing infrastructure. The third part contains of (6) items that measuring the organization's ability and readiness to create marketing value and products from DT. The fourth part contains from (10) items that measuring the institution's readiness to structure and change procedures in line with the institution's DT process. Lastly, the fifth part contains from (4) items that measuring the company's financial readiness and ability in the DT process.

4.5 Reliability Test

The reliability of the questionnaire tested based on Crombach's alpha coefficient. As shown in table (4.1) below the Crombach's alpha results for the (4) DT readiness dimensions of in the questionnaire which follows the (5) point Likert scale. The results show Crombach's alpha value for each dimension above of 0.65, which denotes a high degree of internal consistency among the items included in each of the DT readiness dimensions and therefore a high degree of reliability. Also, the questionnaire overall Crombach's alpha value is (0.949).

Table 4.1

Reliability Test using Crombach's Alpha Coefficient

Reliability Statistics		
Summary	Crombach's Alpha	N of Items
Using technology for digital transformation	0.855	7
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	0.868	6
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	0.885	10
The company's financial readiness and ability in the digital transformation process.	0.842	4
Palestinian Telecom, and ICT Organization Readiness for DT	0.949	27

4.6 Validity Test

The validity test for research instrument in our case the questionnaire was applied, this will identify that whether or not the research instrument will measure what it claim and built to test. Two types of validity tests were applied as explained below:

A. Content-related Validity

The questionnaire content validity was tested by asking group of experts and specialists from different fields such as academic and research, IT, and management to review it. In order to make sure that questionnaire is clear and the items are interrelated and able to achieve the goal of the study. Based on that all received feedbacks taken in consideration and reflected on the questionnaire to get the final version.

B. Validity by Spearman Correlation Test

This test aimed to measure the correlation between questionnaire items, which reflected the measured dimension of digital transformation. In addition, it tests the correlations between different dimensions and the main goal of the study, which is measuring the readiness of Palestinian Telecom, and ICT organization to impalement DT.

1. Spearman correlation test for Use of technology for digital transformation dimension

Below table (4.2) shows, the results of Spearman coefficient test the correlation between each item and Use of technology dimension. The results show the significant level less than 0.05 and high relationship between each item and the total score of items. Therefore, the test shows high validity for each items included in the use of technology dimension.

Table 4.2*Validity Test for Use of Technology Dimension*

Item	Using technology for digital transformation		
	Correlation Coefficient	Sig. (2-tailed)	N
A1	0.827**	0.000	61
A2	0.787**	0.000	61
A3	0.720**	0.000	61
A4	0.753**	0.000	61
A5	0.649**	0.000	61
A6	0.648**	0.000	61
A7	0.385**	0.002	61

2. Spearman correlation test for organization's ability to create marketing value and products from digital transformation dimension

Below table (4.3) shows, the results of Spearman coefficient test the correlation between each item and the organization ability to create marketing value and products dimension. The results show the significant level less than 0.05 and high relationship between each item and the total score of items. Therefore, the test shows high validity for each item included in the organization ability to create marketing value and products dimension.

Table 4.3*Validity Test for Value Creation and New Product Dimension*

Item	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.		
	Correlation Coefficient	Sig. (2-tailed)	N
B1	0.423**	0.001	61
B2	0.800**	0.000	61
B3	0.703**	0.000	61
B4	0.694**	0.000	61
B5	0.820**	0.000	61
B6	0.795**	0.000	61

3. Spearman correlation test for institution's readiness to structure and change procedures in line with the institution's digital transformation process dimension

Below table (4.4) shows, the results of Spearman coefficient test the correlation between each item and the institution's readiness to structure and change procedures dimension.

The results show the significant level less than 0.05 and high relationship between each item and the total score of items. Therefore, the test shows high validity for each item included in the institution's readiness to structure and change procedures dimension.

Table 4.4

Validity Test for Organization Structure and Procedure Change Dimension

Item	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.		
	Correlation Coefficient	Sig. (2-tailed)	N
C1	0.717**	0.000	61
C2	0.490**	0.000	61
C3	0.607**	0.000	61
C4	0.685**	0.000	61
C5	0.685**	0.000	61
C6	0.764**	0.000	61
C7	0.819**	0.000	61
C8	0.612**	0.000	61
C9	0.594**	0.000	61
C10	0.766**	0.000	61

4. Spearman correlation test for company's financial readiness and ability in the digital transformation process dimension

Below table (4.5) shows, the results of Spearman coefficient test the correlation between each item and the financial readiness and ability in the digital transformation process dimension. The results show the significant level less than 0.05 and high relationship between each item and the total score of items. Therefore, the test shows high validity for each item included in the financial readiness and ability in the digital transformation process dimension.

Table 4.5

Validity Test Financial Aspect Dimension

Item	The company's financial readiness and ability in the digital transformation process.		
	Correlation Coefficient	Sig. (2-tailed)	N
D1	0.714**	0.000	61
D2	0.758**	0.000	61
D3	0.759**	0.000	61
D4	0.823**	0.000	61

5. Spearman correlation test for company's overall readiness and ability to the digital transformation process.

Table (B.1) in Appendix - B shows the results of Spearman correlation coefficient test between each item and the overall organization readiness for DT. The results show the significant level less than 0.05 and high relationship between each item and the total score of items. Therefore, the test shows high validity for each items included in the overall organization readiness for DT.

4.7 Research Variables:

The study four independent variables and four Control variables as listed below:

Independent Variables:

1. Use of Technology
2. Value marketing and products.
3. Organization structure, processes, and procedures.
4. Finance position.

Control Variables:

1. Sector of organization.
2. Organization Size from employee point view.
3. Areas where organization offer its services.

4. Availability of IT department in the organization.

4.8 Test of Normality

The normality test applied on collected data for each main dimension include in the study. The test used (Kolmogorov-Smirno) and (Shapiro-Wilk) tests to identify the accurate and suitable tests that will be used to assess and measure the readiness of Palestinian Telecom, and ICT organization for DT implementation. The results of the normality test in Appendix B (Table B.2) shows that data not normally distributed since the probability value of test acceptance is less than 0.05, accordingly the (Non Parametric Tests) will be considered in testing the main objective of the study.

4.9 Statistical Process

The following statistical processes used on the collected data, in order to have acceptable results according to designed methodology:

1. The questionnaire was depending on the (Likert Scale) from (5) answers. These answers summarized as the following, (1) strongly disagree, (2) disagree, (3) normal, (4) agree, and (5) strongly agree.
2. Applying the Reliability test for the questionnaire based on (Crombach's Alpha) value. Also, apply the validity test based on Spearman Correlation Coefficient to measure the items inter correlation within the dimension.
3. Applying descriptive analysis to collected data and calculate the Mean, and standard deviation for each item in the questionnaire.
4. Classifying the Mean value based on the Likert Scale, by calculation the length of interval, which was equal to 0.8. The results shown in table (B.3) in Appendix -B.
5. Applying the normality test for data to identify the accurate test methods need to be considered to test the questionnaire results against the objective of the study.
6. Using the (Kruskal Wallis Test) to test the differences between respondents' feedback for each of Control variables on the independent variables, this used for variables have more than 2 options.

7. Using the (Mann-Whitney Test) to test the differences between respondents' feedback for each of Control variables on the independent variables, this used for variables have only 2 options.

4.10 Research Sample Specifications

Table (B.4) in appendix -B highlights the specification of targeted sample and their responds for Control variables Sector of organization, Organization Size from employee point view, Areas where organization offer its services, and Availability of IT department in the organization.

Regarding the sector in which the organization operates the distribution sample shows that highest percentage from the sample operates in (Software Development) with 32.8%, followed by (Information & Communication Technology - ICT) sector with 24.6%, while remaining sectors (Telecom, ISP, and others) get (14.8%, 13.1%, 14.8%) respectively. The representation of sectors is inconsistency with current situation of the field since there is many of Startup Company that work in software development as outsourcing, in addition to improvement in ICT sector to offer new solutions. On the other side, the Telecom and ISP sectors have lower percentage due to the fact that huge amount of investments need to work in these fields and large competition with Israeli companies.

Regarding the size of the organization with respect to number of employees the distribution sample shows that highest percentage of organization size from the sample has employee (10 -49) employees with 36.1%, followed by (50 - 500) employees with 34.4%, followed by (less than 10) employees with 16.4%, and lastly (above than 500) employees with 13.1%. The representation of organization size is inconsistency with working sectors since the majority of software development and ICT organizations have employees with mention ranges. While only the large national organizations, which work in Telecom sector, some of outsource software development organizations, and multinational companies that have branches in Palestine have employees above 500. As state, there are many of startup organization work as software development and their organization size is less than 10 employees.

Regarding the areas in which the organization offer their services the distribution sample shows that highest percentage from the sample has for areas cover (Palestine and foreign countries) with 37.7%, followed by (West Bank and Gaza Strip) area with 34.4%, followed by (West Bank) area with 16.4%, and lastly (Palestine, including the territories occupied in 1948) employees with 11.5%. The representation of working areas is logic since the majority of organization targeting to offer services inside Palestine and extend it for foreign countries especially the Arabic one in order to increase their revenues and this shown by the highest two percentages. While the lowest percentage for organization offers their services inside Israeli and this due to lack of trust and a lot of restrictions stand as obstacle to offer the services.

Lastly, the variable of existing IT department within the organizations the distribution sample shows that highest percentage from the sample that the majority of organization has IT department (Yes) with 85.2%, while the remaining organization don't have IT department (No) with 14.8%. The representation of having IT department is logic since the majority of organization working in technology fields as shown form their sectors and this leads to have IT department by default.

Chapter Five

Results and Discussion

5.1 Results and Discussions

The results of questionnaire analysis will be discussed and explained in the following section. These results have been concluded after we apply all type of tests on the questionnaire output in order to assess and measure the readiness of Palestinian Telecom, and ICT organizations for DT. It will show the respondents' answers for each dimension that considered in the study, and the overall item, which measures the organization readiness. In addition to display, the respondent's differences based on the Control variables.

5.2 Results and discussion related to the questionnaire:

1. Respondents feedback on use of technology dimension:

The questionnaire has (7) items to measure the use of technology in DT implementation. The below table (5.1) shows the percentage distribution of respondents' answers and opinions, the mean value, and standard deviation value for each item. Furthermore, the overall uses of technology dimension results shown in the table.

Table 5.1

Descriptive Analysis of Respondents for Use of Technology Dimension

Item	Mean	N	Std. Deviation
A1	3.70	61	1.35
A2	3.93	61	1.11
A3	3.82	61	1.06
A4	3.95	61	1.10
A5	4.18	61	0.83
A6	4.23	61	0.80
A7	3.95	61	0.86
Using technology for digital transformation	3.97	61	0.75

- The results in the above table show there is high agree on respondents' answers since the mean vary between 3.70 and 4.23, and the maximum STD value was 1.35 which is acceptable.
- There are around 20% of answers which do not agree that IT department able to collect and analyze the available data; this is consistent with the fact that this task requires highly skills knowledge to do such analysis.
- Around 70% of answers agreed that IT department strategy in line with vision and strategy of organization.
- 65% of responses agreed on use the latest digital technologies. However, most of them refer to mobile applications to provide digital solutions, compare with other digital technologies like Data Mining, IoT, and Cloud services.
- 80% of answers agree on updating and use the latest security measures, use the technology within cooperation department to transfer knowledge, and have their own hardware and software that will reduce the cost of operations.
- The data collection, analysis, and evaluation readiness of ICT companies had the lowest mean (3.70). In this context, it refers to a lack of knowledge and expertise that can analyze the massive amount of data related to the company's customers. Also, most of these companies are ranked as medium and small businesses, which do not have the infrastructure and techniques suited for storing such massive amounts of data.
- Based on the results, the 2nd lowest mean (3.82) is influenced to the availability of modern techniques such as IoT, Cloud, and Big Data. Clearly this has a direct impact on the collection and analysis of the data as explained in previous point. There is a reason for it: investing in new technologies is extremely costly, and these technologies require highly skilled manpower to operate them.
- Overall, there are 82% of opinions agree on using the technology is a main dimension and factor for apply and implement digital transformation.

- Even the statistics results show promising situation about technology infrastructure, the interviewee highlights many of challenges that limit Palestinian companies to build updated infrastructure. All interviewees Consensus that Israel controls the access of infrastructure devices and technology which is considered the main enabler to DT. The following are examples of these devices Fiber cables, Microwave devices, transmission devices, 4G/5G mobile devices.
- As per interviewees, Israel's control does not stop with granting device access privileges. But it's expanded to control and manage the needed frequencies to operate 4G/5G mobile services, and to give approvals for devices features and licenses of latest technology provided by network and telecom vendors.
- Interviewees highlight even if Palestinian companies possess the needed technology and devices, they still need to get approval to work in many areas controlled by Israel like areas categorized as (area - C). Also, nothing can be accessed to Gaza strip without their approval and monitoring which may take several years.
- Despite of interviewees feedback about challenges facing the technology infrastructure. All of them agreed that current and available infrastructure is enough and can handle the DT process, and it was tested during the COVID-19 period since many of private sectors managed to run their business remotely such as banking, education, and ICT.

In general, the respondent's answers and interviewees agree about the importance of technology using as a main factor in any organization to be ready for digital transformation process. This result is in line with global definitions of DT and drivers that need to be consider in DT migration cycle as state in the literature review chapter.

2. Respondents feedback on value creation and new products:

The questionnaire has (6) items to measure the change value and new product creation in DT implementation. The below table (5.2) shows the percentage distribution of respondents' answers and opinions, the mean value, and standard deviation value for each item. Furthermore, the overall organization ability and readiness to create marking value and new product dimension results shown in the table.

Table 5.2*Descriptive Analysis of Respondents for Value Creation and New Product Dimension*

Item	Mean	N	Std. Deviation
B1	4.23	61	0.84
B2	3.98	61	1.01
B3	3.90	61	1.09
B4	3.84	61	1.07
B5	3.95	61	1.09
B6	4.13	61	1.01
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	4.01	61	0.79

- The results in above table show there is high agree on respondents' answers since the mean vary between 3.84 and 4.23, and the maximum STD value was 1.09 which is acceptable.
- There is around 80% of answers have a digital communication with its customers and subscribers, this is consistence with fact that mobile and internet penetration within Palestinian society as shown in literature review chapter.
- around 72% of answers agreed that they monitoring the external markets for new business patterns and technologies, consult external partner to offer new services and products, supports its services and products with digital and smart offers, and lastly analyze their customer needs to offer customized services and products.
- A lower mean is determined by the results related to the creation of new services and products based on analyzing the needs of customers (3.84). There is a point of consistency with information technology infrastructure when it comes to collecting and analyzing customer data. By giving this a significant amount of attention, the company will be in a position to introduce new products and services that will promote their competitive advantage, and this will increase the company's revenues and market shares.

- A second lower mean (3.90) is related to coordination among external partners and suppliers in order to provide customers with digital transformation services. This output is expected from companies in the ICT sector since they strive to provide basic services to their customers such as online customer care. Additionally, despite its role as a main actor in the digital transformation process, the government contributes insufficiently.
- Overall, there are 82% of opinions agree on organization ability and readiness to create marketing value and new products in DT, which is a main dimension and factor for apply and implement digital transformation.
- Even the statistics results appeared that Palestinian organizations are ready to create value and new products and services. The interviewees agreed that there is a major challenge which related to the readiness of Palestinian government for DT.
- Interviewees highlight that many organizations create new service depends on DT based on their customers feedbacks, and to reach new segment of customers. As an example, Jawwal creates Plus application to allow customers apply to new SIM without visiting the showrooms but unfortunately the process has not been completed since government still didn't issue the law and regulation to have e-signature. A similar case faced by Paltel which creates an application to get the needed services, but still the end users have to visit the showroom offices to sign in the application due to lack of regulation and e-signature.
- Even there is a lot of efforts and supports from MTIT in order to launch an e-government services. Interviewees agreed that government in early stage since many of government ministries and organizations are still far from DT. Government still doesn't have a unified payment platform due to lack of legislations. This leads even if the Palestinian private organizations developed services or applications to facilitate the process on the citizens, they faced an issue that governmental organizations themselves are not ready to handle these services.
- On the opposite side according to the interviewees, the government issued the legislations of electronic wallets (e-wallets) like Jawwal-Pay owned by Paltel Group, and Pal-Pay owned by Palestinian Investment Fund (PIF) which will

increase the demand on DT since it will force the commercial companies to consider this as a solution for their customers. Also, it has been working on a project to change the 100 of Postal offices to be a Digital Access Point to offer many governmental services provided to citizens which will make it easier especially in area- C.

In general, the respondent's answers and interviewees agree about the importance of changing value and new products as a main factor in any organization to be ready for digital transformation implementation. This result is in line with global definitions of DT and drivers that need to be consider in DT migration cycle as state in the literature review chapter.

3. Respondents feedback on structural and procedure organization change:

The questionnaire has (10) items to measure the structural and procedure organization changes in DT implementation. The below table (5.3) shows the percentage distribution of respondents' answers and opinions, the mean value, and standard deviation value for each item. Furthermore, the overall of structural and procedure organization changes dimension results shown in the table.

Table 5.3

Descriptive Analysis of Respondents for Organization Structure and Procedure change Dimension

Item	Mean	N	Std. Deviation
C1	4.11	61	0.84
C2	4.08	61	0.80
C3	4.03	61	0.80
C4	3.13	61	1.36
C5	3.98	61	0.85
C6	4.05	61	0.90
C7	3.75	61	1.01
C8	3.79	61	0.93
C9	3.64	61	1.00
C10	3.72	61	1.13
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	3.83	61	0.68

- The results in above table show there is high agree on respondents' answers since the mean vary between 3.13 and 4.11, and the maximum STD value was 1.36 which is acceptable.
- There are around 39% of answers not plan to add separated unit to manage the digital transformation roles and tasks. This may refer to extra cost needed to have this unit and to the fact that 70% of organization categorized as small and medium size organizations.
- Above 70% of answers agreed that senior and top management support the DT process, employees have positive attitude toward the DT changes and they informed about organization direction toward the DT implementation. In addition, they agreed that organizations followed the new method of work and periodically review the existing procedures and work to enhance its flexibility. These are a crucial item to make organization ready for DT since the top management support and leadership will facilitate the process and give it importance within organization, and eliminate any change resistance that may appeared from employees. Furthermore, enhance internal procedures and develop them using digital technologies will add more flexibility and increased the productivity.
- A round 60% of responses agreed that company uses digital forms continuously to plan, design and monitor the procedures, employees' competences are matched with digital transformation challenges, companies consider the digital competences in employee assessments, and companies provide needed training for employees to make them able to handle the new digital technologies. All of these items will create an atmosphere among the organization employees will definitely make the organization ready to DT process.
- Considering the results of the study, the lower mean (3.13) was related to adding a new department within the organization while managing the DT process. Companies avoid to create separated department because of the investments needed to create this department and train the staff needed to handle this process. Moreover, Palestine's majority of ICT companies are smaller and medium-sized, which makes it difficult for them to create a department specifically devoted to handling DT processes.

- The 2nd lower mean (3.64) result is related to consider the DT as part of employees' evaluation process. It may be related to the fact that HR doesn't consider DT as part of their responsibilities when evaluating the manpower of the company.
- Overall, there are 75% of opinions agree on organizational structure and procedure changes are main dimension and factor for apply and implement digital transformation.
- The importance of organizational structure and procedure adjustments was evident even in the statistical results. The interviewees agreed that DT is important in organizations and has a positive impact on development. All of them agreed about the benefits of DT on the organizations by saving the efforts, time, resources and enhance the services offer to the consumer.
- Interviewees highlighted that even they faced a culture resistance by employees on early stage of applying the new process and procedures. However, the culture of employee get improved and they start asking for new services to fulfill their needs and tasks.
- Furthermore, interviewees highlight to expand the awareness about the importance of DT to cover the top management and decision making within Palestinian local boards. Also, they add spots to establish a Telecommunication Regulatory Authority to organize and control the Telecom, ICT, and Digital Transformation sectors.

In general, the respondent's answers and interviewees agree about the importance of change the structure and procedure of organizations to be ready for digital transformation process. This result is in line with the holistic approach of DT, which affects all levels of organizations, not only the technology part. Also, in order to have a successful DT implementation organization has to be considered as main player for this process.

4. Respondents feedback on financial aspects:

The questionnaire has (4) items to measure the financial aspects in DT implementation. The below table (5.4) shows the percentage distribution of respondents' answers and

opinions, the mean value, and standard deviation value for each item. Furthermore, the overall of financial aspects dimension results shown in the table.

Table 5.4

Descriptive Analysis of Respondents for Financial Aspects Dimension

Item	Mean	N	Std. Deviation
D1	4.21	61	0.80
D2	3.98	61	0.99
D3	3.93	61	0.98
D4	3.98	61	0.99
The company's financial readiness and ability in the digital transformation process.	4.03	61	0.78

- The results in above table show there is high agree on respondents answers since the mean vary between 3.93 and 4.21, and the maximum STD value was 0.99 which is acceptable.
- There is around 80% of answers consider the implementation of new digital technologies as an opportunity to emphasize their financial positions and increase the revenue. This result consistence with the importance of digital technologies to open new markets and chances, and allow organizations to have new opportunity to compete on that markets and add new revenues. Furthermore, as states previously using new digital technologies will leads to have new value, service, and product, which will add competitive advantage to the organization.
- 70.5% of answers agreed that organizations financial position allow them to proceed with DT implementation.
- A round 69% of responses agreed that company invest in modern digital technologies and solutions that will develop the existing technical infrastructure.
- A round 73% of responses agreed that top management level they financially support the organization to proceed with DT process.
- According to the results of the study, investing part of an organization's revenue on DT process has the least mean value of 3.93. Owners and top management are more

interested in investing in new fields that will yield large revenues. Furthermore, they don't realize the importance of DT for keeping their organization competitive. Lastly, most organizations invest in normal network expansion but do not consider holistic development processes within company that will lead to major disruption within the organization.

- Overall, there are 83.6% of opinions agree on financial aspects as a main dimension and factor for apply and implement digital transformation.
- Even the statistics results appeared the importance of financial aspects on the DT process. The interviewees agreed how the DT will lead to finance saving. As example changing to e-bill instead of distributing paper bills saved millions of Shekels from the cost of Paltel and Jawwal to issue the bills to their customers. This also apply to the showrooms, dealers, customer support which are in process to be replaced by applications.
- Interviewees confirmed that government depends totally on external supports and funds to run the DT projects and the main reason for having weak infrastructure and e-government services. However, the COVID-19 forced the government to work on DT in order to facilitate the affected sectors work such as education, commercial, and government organizations. In order to bridge the gaps, MTIT get fund from international world bank to accelerate the DT process within government ministries and organizations which will have a reflection on all Palestinian sectors to move forward to DT.

In general, the respondent's answers and interviewees agree about the importance financial aspects and position for organizations to be ready for digital transformation process. This result is agreed with the holistic approach of DT in order to have successful DT implementation organizations have to be financially able to invest in new technologies, hire experts of know-how to implement these technologies, and get advantage of having new market via digital products and solutions which will increase their revenue.

5.3 Tests Results

The analysis of collected data highlights if the respondents have different answers and opinions against main variables and dimensions in addition to the overall objective of the study. The analysis tested using (Kruskal Wallis Test) for variable has more than two options, while using (Mann-Whitney Test) for variable has only two options.

1. Control variables against the use of technology dimension:

Table (B.5) in appendix-B summarized the results for all Control variables with the use of technology dimension, the results show the following:

- There is no difference on respondent answers regarding the use of technology irrespective to the sector that organization operation, since the significant value was (0.859) which is more than significant level 0.05.
- There is difference on respondent answers regarding the use of technology depend on organization size based on the number of employees, since the significant value was (0.025) which is less than significant level 0.05. To explain the results, the (Mean Rank - Appendix C) outputs checked and found that when the size of organization get larger the dependency on use of technology get more and vise versa which is in line with the fact that in order to facilitate large number of employees more techniques and advance technology need to be used and implemented.
- There is no difference on respondent answers regarding the use of technology irrespective to the area where organization offer its services, since the significant value was (0.171) which is more than significant level 0.05.
- There is difference on respondent answers regarding the use of technology depend on the availability of IT department in the organization, since the significant value was (0.002) which is less than significant level 0.05. To explain the results, the (Mean Rank - Appendix C) outputs checked and found that when the organization has IT department will get larger rank compare with don't have IT department which is in line with the fact that the organization has IT department will use the technology more than others.

2. Control variables against the value creation and new product dimension:

Table (B.6) in appendix-B summarized the results for all Control variables with the use of technology dimension, the results show the following:

- There is no difference on respondent answers regarding the value creation and new product dimension irrespective to the sector that organization operation, since the significant value was (0.57) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the value creation and new product dimension irrespective to the organization size based on the number of employees, since the significant value was (0.053) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the value creation and new product dimension irrespective to the area where organization offer its services, since the significant value was (0.05) which is equal to significant level 0.05.
- There is difference on respondent answers regarding the value creation and new product dimension on the availability of IT department in the organization, since the significant value was (0.034) which is less than significant level 0.05. To explain the results, the (Mean Rank - Appendix C) outputs checked and found the organization which has IT department will get larger rank compare with do not have IT department. This is in line with the fact that the organization has IT department will be able to use existing resources to create and develop new services, products, and add more values to existing one.

3. Control variables against the structural and procedure organization change dimension

Table (B.7) in appendix-B summarized the results for all Control variables with the use of technology dimension, the results show the following:

- There is no difference on respondent answers regarding the structural and procedure organization change dimension irrespective to the sector that organization operation, since the significant value was (0.382) which is more than significant level 0.05.

- There is no difference on respondent answers regarding the structural and procedure organization change dimension irrespective to the organization size based on the number of employees, since the significant value was (0.121) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the structural and procedure organization change dimension irrespective to the area where organization offer its services, since the significant value was (0.203) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the structural and procedure organization change dimension irrespective to the availability of IT department in the organization, since the significant value was (0.117) which is more than significant level 0.05.

4. Control variables against the financial aspects dimension:

Table (B.8) in appendix-B summarized the results for all Control variables with the use of technology dimension, the results show the following:

- There is no difference on respondent answers regarding the financial aspects dimension irrespective to the sector that organization operation, since the significant value was (0.547) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the financial aspects dimension irrespective to the organization size based on the number of employees, since the significant value was (0.053) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the financial aspects dimension irrespective to the area where organization offer its services, since the significant value was (0.321) which is more than significant level 0.05.
- There is no difference on respondent answers regarding the financial aspects dimension irrespective to the availability of IT department in the organization, since the significant value was (0.315) which is more than significant level 0.05.

5. Control variables against the organization readiness for DT:

Table (B.9) in appendix-B summarized the results for all Control variables with the use of technology dimension, the results show the following:

- There is no difference on respondent answers regarding the organization readiness for DT irrespective to the sector that organization operation, since the significant value was (0.439) which is more than significant level 0.05.
- There is difference on respondent answers regarding the organization readiness for DT depend on organization size based on the number of employees, since the significant value was (0.022) which is less than significant level 0.05. To explain that we refer to the analysis output in the (Mean Rank- Appendix C) and found that when the size of organization gets larger the organization readiness gets more and vice versa especially in Palestine since these organization looking to compete with Israeli companies, and they are in good financial position to proceed with DT.
- There is no difference on respondent answers regarding the organization readiness for DT irrespective to the area where organization offer its services, since the significant value was (0.096) which is more than significant level 0.05.
- There is difference on respondent answers regarding the organization readiness for DT depend on the availability of IT department in the organization, since the significant value was (0.021) which is less than significant level 0.05. To explain the results, the (Mean Rank - Appendix C) outputs checked and found that when the organization has IT department will get larger rank compare with don't have IT department which is in line with the fact that the organization has IT department will have more readiness to proceed with DT compare with other organization don't have IT department.

5.4 Correlation Tests between dimensions and overall objective Results

The correlation test applied between the dimensions individually to check the correlation relationship among them. In addition, same test applied between the dimensions and the overall objective of the study, which is the Palestinian Telecom and ICT organization readiness for DT.

Based on normality test shown previously that data distribution is not normal, accordingly, we use non-parametric test to check the correlation. (Spearman's rho) correlation coefficient used to test the amount of correlation mentioned above.

Table (B.10) in appendix-B shows the results of the test and display the strong correlation among all dimensions, also with the main objective of the study since the lowest Spearman's correlation coefficient was (0.833) which is very high positive relation and near to 1. In addition, it has shown that organization structural and procedure change has the highest relationship with the overall objective, as the value was (0.936).

5.5 Limitations

During the study many limitations faced which can be listed as below:

- As the study targeting the readiness of ICT companies to DT, and this new trend based on top management instruction. It was difficult to reach them to fill the survey and collect the needed data.
- Most of ICT companies that listed in Palestine market consider very small as has from 3 - 5 employee. These companies exclude from the study, which decrease the study sample size.
- The study includes all regions under the Palestinian authority (West Bank, and Gaza Strip). So, there was limitations to identify all Gaza companies working in ICT sector, which affect to have full view about DT readiness for Gaza ICT companies.
- There were no interviewers to validate the results from Gaza side due to access limitation and communication with Gaza.

Chapter Six

Conclusion and Recommendations

6.1 Conclusion

The digital transformation became a hot topic last decades both in academic and consultancy sides, due to the massive growth in digital technologies. Digital technologies such as smart phones, IoT, Cloud Solutions, AI, ML, and Social networks generate huge amount of data that used by organization to get new opportunities, competitive advantages, new revenue streaming, and customer experience.

So all leaderships and top management levels realize the importance of DT and they think how to implement it within their organizations without any failure issues and to overcome the challenges that may be faced. The initial stage of the implementation process is to assess and measure the readiness of the organizations to have such change.

In Palestine, the ICT sector experienced high growth, in addition to high technology penetration ratio within Palestinian society. Furthermore, government represented by MTIT give the DT highest priority in its agenda to improve all over governmental e-services that offered to citizens. However, there is a gap in digital transformation studies inside Palestine. So that this research aimed to fulfill this gap and highlight the spots on DT by assess and measure the readiness of Palestinian Telecom, and ICT organization or DT process and implementation, since these sectors considered as stone coroner in any DT process and if they are ready all other sectors can follow them.

The Digital Transformation Frame used in this research and by using a quantitative approach to analyze the collected data from targeted sample (Telecom, ISPs, ICT, and Software development) organizations. The questionnaire measured the organization from four different factors affecting the DT readiness, the use of technology, value creation and new products, organization structure change, and financial aspects. Based on results and applied statistical tests on collected data it concluded that Palestinian Telecom and ICT organizations are ready for DT process. Furthermore, the quantitative results were validated by using semi-structure interview approach with expertise in the targeted fields, The results and interviewees feedback show high correlation and relationships between all factors and main objective of the study. In addition, it showed

high relationships among the factors to each other. At the same time, many challenges were highlighted related to Palestinian political situation which narrow and limit the expansion in DT process among different sectors.

This study with its outputs can be used for other academic studies on subject topic in Palestine, and used as reference for other organizations studies.

6.2 Recommendations

After studying the DT readiness in Palestinian Telecom and ICT organizations to achieve the goal of the study, the following are the proposed recommendations related to study results and other recommendation for further studies in DT:

- It's recommended for an organization to hire expertise that can analyze the massive amount of data related to the company's customers. This will help policy makers and top management to update their business strategies according to their customers feedback, so companies will be able to create new value and products/services.
- It's recommended for SMB companies to host and rent the needed infrastructure and techniques suited for storing such massive amounts of data from available Data Centers. So, they can refer to this data and apply required analysis.
- As new technologies will be expensive to be implemented in SMB companies. So, it's recommended for companies to use external cloud resources like Microsoft, Google, etc. in order to run their business. Also, to consider third party outsourcing which have skilled staff.
- It's required and recommended that government represented by MTIT to raise Palestinian voice in international conferences to get our full rights in accessing technologies, devices, frequencies and licenses. Furthermore, to grab the ability to work and extend infrastructure in all lands under Palestinian authority without any restrictions from Israel side. This will increase the level of infrastructure which is the corner stone on DT process, also it will minimize the cost by using latest technologies.

- It's recommended for Palestinian organization to enhance the relationship with external vendors, suppliers, partners, and technology innovators to be updated with latest technology, and offered products/services in similar sectors.
- It's recommended to have national committee includes government represented by MTIT and all stakeholders and players in DT process. This will encourage the corporation and coordination to determined the current challenges and limitations which has to be resolved to get actual DT environment in the sectors.
- It's recommended that government to release the needed laws and regulations to have e-signature and to have the Telecommunication Regulatory Authority which will be consider as third party to control movement toward the DT. Also, MTIT has to arrange for awareness workshops to other government ministries to highlight importance of DT and its impact on overall development.
- It's recommended that government to launch e-government services and to have a unified payment platform. Furthermore, MTIT has to force all related entities within government to use them in order to built needed culture within citizens and organizations to use applications to get their services.
- It's recommended to have a new and separated department within the organization to manage the DT process. Also, to train the staff to handle this process. Moreover, it's recommended to consider the DT knowledge part of HR employee evaluation within an organization to force employee to be ready for a new stage of DT.
- It's recommended to highlight the importance of DT to companies Owners and top management, and its financial impact on companies' resources since investing in developing the services and technologies will leads to decrease the overhead costs and increase the company's revenue.
- It is highly recommended to study the DT readiness in other sectors or industries like government, municipalities, education, healthcare, and finance sectors.
- It is highly recommended to study in details a fully digital transformed organization to get the benefit and identify the faced challenges during the transformation process.

- It is highly recommend focusing the study on one factor to have more details about its actual impact on DT of organizations.

List of Abbreviations

Abbreviation	Meaning
2G	Second Generation
3G	Third Generation
AI	Artificial Intelligence
CA	Certificate authority
DT	Digital Transformation
GDP	Gross domestic product
GEMS	Government Electronic and Mobile Services
G2C	Government to Citizen
ML	Machine Learning
MTIT	Ministry of Telecommunication and Information Technology
ICT	Information and Communication Technology
IoT	Internet of Things
ISP	Internet Service Provider
PA	Palestinian Authority
PCBS	Palestinian Central Bureau of Statistics
PITA	Palestinian Information Technology Association
PKI	Public Key Infrastructure
SMAC	Social, Mobile, Analytics, and Cloud
STS	Sociotechnical systems
VOIP	Voice over IP

References

- [1] Henriette E, Feki M, Boughzala I. Association for Information Systems AIS Electronic Library (AISeL) The Shape of Digital Transformation: A Systematic Literature Review THE SHAPE OF DIGITAL TRANSFORMATION: A SYSTEMATIC LITERATURE REVIEW. Ninth Mediterr Conf Inf Syst. 2015;
- [2] Lucas Jr HC. Disruptive technology: How Kodak missed the digital photography revolution. . J Strateg Inf Syst. 2009;18(1):46–55.
- [3] Vijay PG. Theoretical and Empirical Development in Management and IT. 2018; Available from: https://www.researchgate.net/profile/Madhu_Bala22/publication/338163798_Digital_Transformation_Review_of_Concept_Digital_Framework_and_Challenges/links/5e0457af299bf10bc379751b/Digital-Transformation-Review-of-Concept-Digital-Framework-and-Challenges.pdf
- [4] PCBS. 2019 / 05 / 16 [Internet]. 2019. Available from: <http://www.pcbs.gov.ps/>
- [5] Morar R. Palestine Economic Policy Research Institute. 2018;(December).
- [6] Menacatalyst. Transforming Palestine’s Digital Landscape: Cross-Sector Collaboration e. 2019. p. <https://www.menacatalyst.ps/blog/4892.html>.
- [7] Khater DM. Going Digital: It is high time to establish the “Digital Development National Authority” in Palestine. 2019;
- [8] Downes L, Nunes P. Big bang disruption. Harv Bus Rev. 2013;44–56.
- [9] Westerman, G., Calm ejane, C., Bonnet, D., Ferraris, P., & McAfee A. Digital Transformation: A roadmap for billion-dollar organizations. MIT Cent Digit Bus capgemini Consult. 2011;1:1–68.
- [10] Li F. Digital technologies and the changing business models in creative industries. 2015 48th Hawaii Int Conf Syst Sci IEEE. 2015;1265–74.
- [11] Piccinini, E., Hanelt, A., Gregory, R., & Kolbe L. Transforming industrial business: The impact of digital transformation on automotive organizations. 2015;

- [12] Hansen, R., & Sia SK. Hummel's Digital Transformation Toward Omnichannel Retailing: Key Lessons Learned. *MIS Q Exec.* 2015;14(2).
- [13] Imran F, Shahzad K, Butt A, Kantola J. Digital Transformation of Industrial Organizations: Toward an Integrated Framework. *J Chang Manag.* 2021;(May).
- [14] Gibe, J., & Kalling T. *Business Models and Strategy.* Studentlitteratur AB; 2019.
- [15] Brynjolfsson, E., & Hitt LM. Beyond the productivity paradox. , 41(8), . *Commun ACM.* 1998;41(8):49–55.
- [16] Westerman, G., Bonnet, D., & McAfee A. *Leading digital: Turning technology into business transformation.* Harvard Business Press; 2014.
- [17] Brynjolfsson, E., & McAfee A. *The second machine age: Work, progress, and prosperity in a time of brilliant technologies.* WW Norton & Company.; 2014.
- [18] Vogelsang M. *Digitalization in open economies: Theory and policy implications.* Springer Science & Business Media; 2010.
- [19] Udhas, P., Sridharan, P., & Raman KK. *The SMAC Code – Embracing new Technologies for future Business.* KPMG. 2015;1–32.
- [20] Gartner. Gartner Says 4.9 Billion Connected “Things” Will Be in Used in 2015. 2014; Available from: <http://www.gartner.com/newsroom/id/2905717>
- [21] Bharadwaj A, El Sawy OA, Pavlou PA, Venkatraman N. Digital business strategy: Toward a next generation of insights. *MIS Q Manag Inf Syst.* 2013;
- [22] Brooks, D. C., & McCormack M. *Driving Digital Transformation in Higher Education.* ECAR Res Rep. 2020;(June):1–25.
- [23] Janssen M, Merk J. *How Digital Transformation Changes Work Design : A Butterfly Emerging from its Chrysalis ?* 2019;
- [24] Schallmo DRA, Williams CA. *Digital Transformation Now! Guiding the Successful Digitalization of YourBusiness Model.* Springer Science+ Business Media, LLC.; 2018.

- [25] Gassmann O, Frankenberger K, Csik M. St. Gallen Business Model Navigator. 2016;
- [26] Gimpel H, Röglinger M. Digital Transformation: Changes and Chances. *Fraunhofer Inst Appl Inf Technol Fit*. 2015;1–20.
- [27] Brennen S, Kreiss D. Digitalization and Digitization [Internet]. 2014. Available from: <https://culturedigitally.org/2014/09/digitalization-and-digitization/>
- [28] Gharib E. How does the Digital Transformation Change the Strategy of a Telecommunication Company? *JamkFi* [Internet]. 2019;1(April):97. Available from: <https://www.theseus.fi/handle/10024/185499>
- [29] Gray, J., & Rumpe B. Models for digitalization. *Softw Syst Model* [Internet]. 2015;14(4):1319–20. Available from: <https://doi.org/10.1007/s10270-015-0494-9>
- [30] Fichman, R. G., Dos Santos, B. L., & Zheng Z. Digital innovation as a fundamental and powerful concept in the information systems curriculum. *MIS Q*. 2014;38(2):329-A15.
- [31] Janowski T. Digital government evolution: From transformation to contextualization. *Gov Inf Q*. 2015;32(3):221-236.
- [32] I-SCOOP. Digitization, digitalization, digital and transformation: the differences. 2016.
- [33] BusinessDictionary. Definition: Digitalization. 2019.
- [34] Lucas HC, Agarwal R, Clemons EK, El Sawy OA, Weber B. Impactful research on transformational information technology: An opportunity to inform new audiences. *MIS Quarterly: Management Information Systems*. 2013.
- [35] Liu, D. Y., Chen, S. W., & Chou TC. Resource fit in digital transformation: Lessons learned from the CBC Bank global e-banking project. *Manag Decis*. 2011;

- [36] Schuchmann, D., & Seufert S. Corporate learning in times of digital transformation: a conceptual framework and service portfolio for the learning function in banking organisations. *Int J Corp Learn*. 2015;8(1):31–9.
- [37] Mithas S, Tafti A, Mitchell W. How a firm’s competitive environment and digital strategic posture influence digital business strategy. *MIS Q Manag Inf Syst*. 2013;
- [38] Hess T, Benlian A, Matt C, Wiesböck F. Options for formulating a digital transformation strategy. *MIS Q Exec*. 2016;
- [39] BMWi. Industrie 4.0 und Digitale Wirtschaft. Bundesministerium für Wirtschaft und Energie Öffentlichkeitsarbeit. 2015.
- [40] Bowersox, D. J., Closs, D. J., & Drayer RW. The digital transformation: technology and beyond. *Supply Chain Manag Rev*. 2005;9(1):22–9.
- [41] Mazzone DM. Digital or death: digital transformation: the only choice for business to survive smash and conquer. Smashbox Consulting Inc.; 2014.
- [42] Fitzgerald M, Kruschwitz N, Bonnet D, Welch M. Embracing Digital Technology: A New Strategic Imperative | Capgemini Consulting Worldwide. *MIT Sloan Manag Rev*. 2013;
- [43] McDonald MP, Rowsell-Jones A. The Digital Edge: Exploiting Information & Technology For Business Advantage. Gartner Inc. 2012.
- [44] Stolterman E, Fors AC. Information technology and the good life. In: *IFIP Advances in Information and Communication Technology*. 2004.
- [45] Martin A. Digital Literacy and the “Digital Society.” In: *Digital Literacies: Concepts, Policies & Practices*. 2008.
- [46] Hess T, Benlian A, Matt C, Wiesböck F. How German Media Companies Defined Their Digital Transformation Strategies. *MIS Q Exec*. 2016;15(2):103–19.
- [47] Vial G. Understanding digital transformation: A review and a research agenda. *J Strateg Inf Syst*. 2019;28(2):118–44.

- [48] Lezina, T., Stoianova, O., Ivanova, V., & Gadasina L. Assessment the company's readiness for digital transformation: Clarifying the issue. *Int Conf Digit Econ.* 2019;3–14.
- [49] Matt C, Hess T, Benlian A. Digital Transformation Strategies. *Bus Inf Syst Eng.* 2015;57(5):339–43.
- [50] Arpe B, Kurmann P. Managing Digital Transformation - How organizations turn digital transformation into business practices. Master's Program Int Strateg Manag [Internet]. 2019;(June). Available from: <http://lup.lub.lu.se/student-papers/record/8989064>
- [51] VanBoskirk MG and S. The Digital Maturity Model 4 . 0. Forrester. 2016;0–17.
- [52] Gentile, C., Spiller, N., & Noci G. How to sustain the customer experience:: An overview of experience components that co-create value with the customer. *Eur Manag J.* 2007;25:395–410.
- [53] Sanchez MA, Zuntini JI. Organizational readiness for the digital transformation: a case study research. *Rev Gestão Tecnol.* 2018;18(2):70–99.
- [54] FOUAD A. B. KAZIM. Transformation and Leadership Style : A Multiple Case Study. *ISM J Digit.* 2019;3(1):24–33.
- [55] Vantara H, Kalakota R. Transform Healthcare: A Data-Driven Strategy for Digital Transformation. 2019; Available from: <https://www.hitachivantara.com/en-us/pdfd/white-paper/digital-transformation-of-healthcare-industry-liquid-hub-whitepaper.pdf>
- [56] Valdez-de-Leon O. A Digital Maturity Model for Telecommunications Service Providers. *Technol Innov Manag Rev.* 2016;6(8):19–32.
- [57] Gebhart M, Giessler P, Abeck S. Challenges of the Digital Transformation in Software Engineering. *ISCEA 2016 Elev Int Conf Softw Eng Adv.* 2016;(c): 136–41.
- [58] Hanna N. Mastering Digital Transformation: Towards a Smarter Society, Economy, City and Nation. Emerald Group Publishing Limited; 2015.

- [59] Ochs C. Emerging Trends in Software Development & Implications for IT Security: An Explorative Study. EC SPRIDE. 2014;(June).
- [60] Berman SJ. Digital transformation: opportunities to create new business models. Strateg Leadership. 2012;
- [61] Leimeister, J. M., Österle, H., & Alter S. Digital services for consumers. Electron Mark. 2014;24(4):255–8.
- [62] Trust TP. The ICT sector in the Palestinian Territory. 2012;(August):2–5.
- [63] PITA. The ICT Sector in Palestine [Internet]. 2018. Available from: <http://home.pita.ps/wp/the-palestinian-ict-sector-2>
- [64] MTIT. النشأة والتطور [Internet]. 2020. Available from: <https://www.mtit.pna.ps/Site/Articles>
- [65] Paltel Group. About the Group [Internet]. 2019. Available from: <https://www.paltelgroup.ps/#about>
- [66] PITA. About PITA [Internet]. 2021. Available from: <http://home.pita.ps/wp/overview#tab-5-1>
- [67] Issa Noursi. Palestinian Market Briefs [Internet]. export.gov. 2016. Available from: https://2016.export.gov/westbank/palestinianmarketbriefs/index.asp#P27_4165
- [68] PCBS. 2019. تقرير المسح الأسري لتكنولوجيا المعلومات والاتصالات 2019. Available from: <https://www.pcbs.gov.ps/PCBS-Metadata-ar-v4.3/index.php/catalog/476>
- [69] PITA. EXPOTECH TECHNOLOGY WEEK 2018 Final Technical Report. 2018;(September). Available from: <http://home.pita.ps/wp/wp-content/uploads/pita/final-report-WB&GA.pdf>
- [70] PCBS. عدد المؤسسات والعاملين وأهم المؤشرات الاقتصادية لأنشطة الاتصالات والمعلومات في فلسطين [Internet]. 2018. Available from: https://www.pcbs.gov.ps/Portals/_Rainbow/Documents/com_annual1_2018a.html

- [71] PCBS & MTIT. Palestinian Central Bureau of Statistics (PCBS) and the Ministry of Telecom and Information Technology issue a joint press release on the eve of the World Telecommunication and Information Society Day 17/05/2021. [Internet]. 2021. Available from: <https://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=3989>
- [72] Anan AbuShanab. Connection Interrupted: Israel's Control of the Palestinian ICT Infrastructure and Its Impact on Digital Rights. 7amleh - The Arab Center for the Advancement of Social Media [Internet]. 2018;(December). Available from: www.7amleh.org
- [73] Bezzina J, El-Cassabgui J. Unlocking the potential of the digital economy in the Palestinian territories [Internet]. 2021. Available from: <https://blogs.worldbank.org/digital-development/unlocking-potential-digital-economy-palestinian-territories>
- [74] World Bank. Digital West Bank & Gaza Project [Internet]. 2021. Available from: <https://projects.albankaldawli.org/ar/projects-operations/project-detail/P174355>
- [75] The World Bank. Digital West Bank & Gaza (P174355). 2020;1–13. Available from: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2011/03/25/00001843_20110329141118/Rendered/PDF/P1217550PID0ap1or0InfoShop0March25.pdf
- [76] MTIT. وزارة الاتصالات وتكنولوجيا المعلومات تعقد الاجتماع الاول للجنة التوجيهية المكونه من المؤسسات المعنية بمشروع البنك الدولي (DIGITAL WEST BANK & GAZA (P174355) . [Internet]. 2021. Available from: <https://www.mtit.pna.ps/Site/New/280>
- [77] ESCWA. Government Electronic and Mobile Services (GEMS) Maturity Index. 2021.

Interviews

- [1] Aref Hanaysheh, Project Manager at I-Connect, Ramallah, 2022
- [2] Helmi Hajj, IT and digital Senior Department Head at Paltel, Nablus, 2022

- [3] Qutaiba Khuwaireh, Digital Consultant at International World Bank, Ramallah, 2022
- [4] Raed Hijawi, Program Manager Officer (PMO) at Jawwal, Ramallah, 2022
- [5] Tareef AbdelHalaim, Core Network Senior Department Head at Paltel, Nablus, 2022
- [6] Yazan Jaber, Co-founder and General Manager at Telnet, Ramallah, 2022

Appendices

Appendix A

Questionnaire Details

أخي الفاضل / أختي الفاضلة

تحية طيبة وبعد،،

يقوم الباحث بإجراء دراسة بعنوان " قياس جاهزية شركات التكنولوجيا للتحويل الرقمي " كمتطلب للحصول على درجة الماجستير في الإدارة الهندسية من جامعة النجاح الوطنية.

نرجو من حضرتكم مراعاة الموضوعية والمصداقية في تعبئة الإستبانة علما بأنه سيتم مراعاة السرية في البيانات التي ستدلون بها وأن هذه البيانات سيتم استخدامها لأغراض البحث العلمي فقط.

ولكم مني جزيل الشكر والتقدير

المشرف على الرسالة: د. رايح مرار

الباحث: أيمن مرواح نمر حمارشة

القسم الأول:

يحتوي هذا القسم معلومات عن المؤسسة وعن الشخص المسؤول عن تعبئة هذه الاستمارة.

المعلومات العامة

• القطاع التي تعمل به الشركة:

1. الاتصالات و الموبايل (Telecom Sector)
2. مزود انترنت (Internet Service Provider)
3. مطور برامج (Software Development)
4. Information & Communication Technology - ICT
5. أخرى

• حجم الشركة من حيث عدد الموظفين:

1. أقل من 10 موظف
2. من 10 - 49 موظف
3. من 50 - 500 موظف
4. أكثر من 500 موظف

• المناطق التي تقدم فيها الشركة خدماتها :

1. الضفة الغربية فقط
2. الضفة الغربية وغزة
3. فلسطين و الداخل المحتل
4. فلسطين و الدول الاجنبية

• هل تشتمل الشركة على قسم لإدارة تكنولوجيا المعلومات:

1. نعم
2. لا

- المنصب الذي تشغله داخل الشركة:

القسم الثاني:

يتكون هذا القسم من أربع أجزاء رئيسية:

- الجزء الأول: يتعلق بقياس معيار استخدام التكنولوجيا والتقنية وجاهزية المؤسسة للتحول الرقمي.
- الجزء الثاني: يتعلق بقياس قدرة وجاهزية المؤسسة على خلق قيمة تسويقية ومنتجات من التحول الرقمي.
- الجزء الثالث: يقيس جاهزية المؤسسة على الهيكلة وتغيير الاجراءات بما يتماشى مع عملية التحول الرقمي للمؤسسة.
- الجزء الرابع: يقيس جاهزية وقدرة الشركة ماليا في عملية التحول الرقمي.

(A) معيار جاهزية البنية التحتية في المؤسسة واستخدام التكنولوجيا والتقنية للتحويل الرقمي

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	
					A1 تمتلك الشركة دائرة تقنية معلومات قادرة على جمع وفحص وتحليل وتقييم البيانات الخاصة بالمشاركين والمنتجات بشكل فوري ما يساعد على اخذ القرارات المناسبة في عملية التحويل الرقمي
					A2 تعمل إدارة تقنية المعلومات على تحقيق الاهداف الاستراتيجية للشركة وتسريع عملية التحويل الرقمي
					A3 تستخدم الشركة أحدث التقنيات الرقمية بشكل روتيني ومستمر مثل Cloud solutions, mobile end devices, IoT,) Data Mining, AI, etc)
					A4 تستثمر الشركة على استخدام آخر التقنيات بحيث تكون الرائدة في مجالها مما يمكنها بالاستحواذ على السوق وليست تابعة للآخرين.
					A5 تعتمد الشركة وتتبع المعايير والتنظيمات المعتمدة في أمن المعلومات لحماية البيانات الخاصة بالشركة ومشاركتها
					A6 تعتمد الشركة بشكل كبير على استخدام وسائل التقنية والاتصالات لتطوير التعاون بين الاقسام المختلفة ونقل المعرفة في الشركة ما يسهل عملية التحويل الرقمي.
					A7 تمتلك الشركة التقنيات والاجهزة (Hardware, and Software) والتي تخفف تكلفة الأتمتة والتحول الرقمي.

معيار جاهزية لمؤسسة المنافسة و خلق منتجات و تغيير القيمة التسويقية من خلال التحويل

(B) الرقمي

لا أوافق بشدة	لا أوافق	محايد	أوافق	أوافق بشدة	
					B1 يوجد في الشركة تواصل رقمي مع زبائنها ومشاركتها
					B2 تراقب الشركة بشكل مستمر ومنتظم السوق الخارجي والتطور التقني لتحديد الانماط الجديدة لتطوير الاعمال التجارية و استغلال الفرص
					B3 الشركة تستشير الشركاء الخارجيين (الموردين ، الشركاء التجاريين ، الزبائن) في تطوير المنتجات و الخدمات الرقمية
					B4 تحلل الشركة بشكل علمي ومستمر البيانات المجمع رقميا من أجل تطوير منتجات و خدمات جديدة
					B5 تدعم الشركة بشكل كامل منتجاتها و خدماتها بعروض رقمية و ذكية للتسهيل على زبائنها
					B6 تعمل الشركة على تحليل احتياجات زبائنها و تعمل على تطوير خدمات و منتجات لكل زبون بما يتلاءم مع متطلباته

C) معيار جاهزية المؤسسة للهيكلة وتغيير الاجراءات في عملية التحول الرقمي

	أوافق بشدة	أوافق	محايد	لا أوافق بشدة	لا أوافق بشدة
C1					تدعم وتقود الادارة العليا بشكل كبير عملية التحول الرقمي في الشركة
C2					يوجد لدى الموظفين بالشركة السلوك الايجابي تجاه عملية التحول الرقمي و ما يترتب عليها من تغييرات
C3					يتم إعلام الموظفين بالنشاطات الخاصة بالتحول الرقمي للشركة فيها بما يخدم التوجه و تحقيق الهدف
C4					تخطط الشركة لإضافة إدارة وحدة مستقلة و خاصة لعمليات التحول الرقمي الجديدة
C5					تستخدم الشركة بشكل كبير الوسائل الجديدة في العمل و التي تساهم بمورنة انجاز الاعمال للمؤسسة بالاعتماد على التقنيات الرقمية الحديثة
C6					تراجع الشركة بشكل دوري اجراءات العمل و تعمل على تطويرها باستخدام التقنيات الرقمية لزيادة مرونتها
C7					تستخدم الشركة النماذج الرقمية بشكل مستمر للتخطيط و تصميم و مراقبة الاجراءات الخاصة بعمل الشركة مما يساهم في توزيع الادوار و المسؤوليات في المؤسسة
C8					تتلائم الكفاءات المحترفة للموظفين بما يساهم بالتغلب على تحديات التحول الرقمي في الشركة
C9					تعتمد الشركة في تقييمها لأداء الموظفين على الكفاءات الرقمية لديهم لتكون قادرة على التعامل السريع مع الاحتياجات المتغيرة للتحول الرقمي
C10					تقدم الشركة برامج التدريب والتعليم الضرورية للموظفين لزيادة مهاراتهم في التعامل مع اخر التطورات في التقنيات الرقمية

D) معيار الجاهزية المالية للتحول الرقمي

	أوافق بشدة	أوافق	محايد	لا أوافق بشدة	لا أوافق بشدة
D1					تعتبر الشركة التقنيات الرقمية الحديثة فرصة لتعزيز الوضع المالي لها
D2					يسمح الوضع المالي للشركة بتطبيق عملية التحول الرقمي
D3					تستثمر الشركة جزء من اموالها في الحلول الرقمية الحديثة والتي تعمل على تطوير البنية التقنية الموجودة للشركة
D4					تدعم الادارة العليا في الشركة ماليا بشكل كبير التحول الرقمي في الشركة

ملاحظات أخرى ترغب بإضافتها:

شكرا لاهتمامكم بالبحث العلمي وناسف لإزعاجكم ونقدر وقتكم الثمين

Appendix B

Tables of Study

Table B.1

Validity Test for Overall Organization Readiness for DT

	All Components		
	Correlation Coefficient	Sig. (2-tailed)	N
The company has an information technology department capable of collecting, examining, analyzing and evaluating data on subscribers and products in real time, which helps to take appropriate decisions in the process of digital transformation.	.652**	.000	61
The Information Technology Department works to achieve the strategic goals of the company and accelerate the process of digital transformation	.735**	.000	61
The company routinely and continuously uses the latest digital technologies such as (Cloud solutions, mobile end devices, IoT, Data Mining, AI, etc)	.688**	.000	61
The company invests in bringing in the latest technologies so that it is the leader in its field, which enables it to take over the market and is not affiliated with others.	.576**	.000	61
The company adopts and follows the approved standards and regulations in information security to protect the data of the company and its subscribers	.574**	.000	61
The company relies heavily on the use of technology and communications to develop cooperation between different departments and transfer knowledge in the company, which facilitates the process of digital transformation.	.625**	.000	61
The company owns the technologies and devices (Hardware, and Software) that reduce the cost of automation and digital transformation.	.598**	.000	61
The company has digital communication with its customers and subscribers	.411**	.001	61
The company continuously and regularly monitors the external market and technical development to identify new patterns of business development and exploitation of opportunities	.644**	.000	61
The company consults external partners (suppliers, business partners, customers) in the development of digital products and services	.627**	.000	61
The company scientifically and continuously analyzes the digitally collected data in order to develop new products and services	.802**	.000	61
The company fully supports its products and services with digital and smart offers to facilitate its customers	.752**	.000	61
The company analyzes the needs of its customers and works to develop services and products for each customer in line with their requirements	.622**	.000	61
Senior management greatly supports and leads the company's digital transformation process	.734**	.000	61
The company's employees have a positive attitude towards the digital transformation process and the resulting changes	.489**	.000	61

Employees are informed of the company's digital transformation activities in order to serve the direction and achieve the goal	.534**	.000	61
The company plans to add a separate unit management, especially for the new digital transformation operations	.707**	.000	61
The company makes great use of new methods of work that contribute to the flexibility of doing business for the organization by relying on modern digital technologies	.749**	.000	61
The company periodically reviews work procedures and works to develop them using digital technologies to increase their flexibility	.775**	.000	61
The company uses digital forms continuously to plan, design and monitor the procedures for the company's work, which contributes to the distribution of roles and responsibilities in the organization	.771**	.000	61
The professional competencies of employees are matched, which contributes to overcoming the challenges of digital transformation in the company	.574**	.000	61
The company bases its employee performance assessment on their digital competencies to be able to quickly deal with the changing needs of digital transformation	.588**	.000	61
The company provides the necessary training and education programs for employees to increase their skills in dealing with the latest developments in digital technologies	.782**	.000	61
The company considers modern digital technologies an opportunity to enhance its financial position	.605**	.000	61
The financial position of the company allows the implementation of the digital transformation process	.587**	.000	61
The company invests part of its money in modern digital solutions that develop the existing technical infrastructure of the company	.795**	.000	61
The company's senior management financially supports the digital transformation of the company	.863**	.000	61
All Components	1.000		61

Table B.2

Normality Test Results

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Using technology for digital transformation	.107	61	.077	.944	61	.008
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	.153	61	.001	.912	61	.000
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	.077	61	.000	.976	61	.000
The company's financial readiness and ability in the digital transformation process.	.114	61	.047	.929	61	.002
All Components	.081	61	.000	.966	61	.090

Table B.3*Mean Value Classification Based on Likert Scale*

Interval	Classification
1.00 - 1.80	Strongly Low
1.81 - 2.60	Low
2.61 - 3.40	Middle
3.41 - 4.20	High
4.21 - 5.00	Strongly High

Table B.4*Percentage Distribution of Sample Respondents based on Control Variables*

Variable	Items	Frequency	Percent (%)
The sector in which the company operates	Telecom Sector	9	14.8
	Internet Service Provider	8	13.1
	Software Development	20	32.8
	Information & Communication Technology - ICT	15	24.6
	Other fields	9	14.8
The company size in terms of the number of employees	Less than 10 employees	10	16.4
	10-49 employees	22	36.1
	50-500 employees	21	34.4
	More than 500 employees	8	13.1
The areas in which the company provides its services	West Bank	10	16.4
	West Bank and Gaza Strip	21	34.4
	Palestine, including the territories occupied in 1948	7	11.5
	Palestine and foreign countries	23	37.7
Does the company include a department for information technology management	Yes	52	85.2
	No	9	14.8

Table B.5*Results of Respondents Opinions about Use of Technology based on Control Variables*

Item	Test Type	Significant Value
Sector of organization.	Kruskal Wallis Test	0.859
Organization Size from employee point view.	Kruskal Wallis Test	0.025
Areas where organization offer its services.	Kruskal Wallis Test	0.171
Availability of IT department in the organization.	Mann-Whitney Test	0.002

Table B.6

Results of Respondents Opinions about Value Creation and New Product based on Control Variables

Item	Test Type	Significant Value
Sector of organization.	Kruskal Wallis Test	0.57
Organization Size from employee point view.	Kruskal Wallis Test	0.053
Areas where organization offer its services.	Kruskal Wallis Test	0.05
Availability of IT department in the organization.	Mann-Whitney Test	0.034

Table B.7

Results of Respondents Opinions about Organization Structure and Procedure Change based on Control Variables

Item	Test Type	Significant Value
Sector of organization.	Kruskal Wallis Test	0.382
Organization Size from employee point view.	Kruskal Wallis Test	0.121
Areas where organization offer its services.	Kruskal Wallis Test	0.203
Availability of IT department in the organization.	Mann-Whitney Test	0.117

Table B.8

Results of Respondents Opinions about Financial Aspects based on Control Variables

Item	Test Type	Significant Value
Sector of organization.	Kruskal Wallis Test	0.547
Organization Size from employee point view.	Kruskal Wallis Test	0.053
Areas where organization offer its services.	Kruskal Wallis Test	0.321
Availability of IT department in the organization.	Mann-Whitney Test	0.315

Table B.9

Results of Respondents Opinions about Organization Readiness for DT based on Control Variables

Item	Test Type	Significant Value
Sector of organization.	Kruskal Wallis Test	0.439
Organization Size from employee point view.	Kruskal Wallis Test	0.022
Areas where organization offer its services.	Kruskal Wallis Test	0.096
Availability of IT department in the organization.	Mann-Whitney Test	0.021

Table B.10

Results of Spearman's Correlation Coefficient between the DT dimensions and DT Readiness

Item	Use of Technology	Value Creation and new Product	Organization structural and procedure change	Financial Aspect	Palestinian Telecom and ICT organization Readiness for DT
Use of Technology	1.000	0.654	0.657	0.616	0.833
Value Creation and new Product	0.654	1.000	0.713	0.607	0.839
Organization structural and procedure change	0.657	0.713	1.000	0.811	0.936
Financial Aspect	0.616	0.607	0.811	1.000	0.849
Palestinian Telecom and ICT organization Readiness for DT	0.833	0.839	0.936	0.849	1.000

Appendix C

Statistical Analysis Results

Sample Profile Results:

The sector in which the company operates:					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Telecom Sector	9	14.8	14.8	14.8
	Internet Service Provider	8	13.1	13.1	27.9
	Software Development	20	32.8	32.8	60.7
	Information & Communication Technology - ICT	15	24.6	24.6	85.2
	Other fields	9	14.8	14.8	100.0
	Total	61	100.0	100.0	

The company size in terms of the number of employees:					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 10 employees	10	16.4	16.4	16.4
	10-49 employees	22	36.1	36.1	52.5
	50-500 employees	21	34.4	34.4	86.9
	More than 500 employees	8	13.1	13.1	100.0
	Total	61	100.0	100.0	

The areas in which the company provides its services					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	West Bank	10	16.4	16.4	16.4
	West Bank and Gaza Strip	21	34.4	34.4	50.8
	Palestine, including the territories occupied in 1948	7	11.5	11.5	62.3
	Palestine and foreign countries	23	37.7	37.7	100.0
	Total	61	100.0	100.0	

Does the company include a department for information technology management:					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	52	85.2	85.2	85.2
	No	9	14.8	14.8	100.0
	Total	61	100.0	100.0	

Descriptive Analysis Results:

Respondents feedback on use of technology dimension:

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	N	Std. Deviation
The company has an information technology department capable of collecting, examining, analyzing and evaluating data on subscribers and products in real time, which helps to take appropriate decisions in the process of digital transformation.	9.8%	11.5%	14.8%	26.2%	37.7%	3.70	61	1.35
The Information Technology Department works to achieve the strategic goals of the company and accelerate the process of digital transformation	4.9%	4.9%	19.7%	32.8%	37.7%	3.93	61	1.11
The company routinely and continuously uses the latest digital technologies such as (Cloud solutions, mobile end devices, IoT, Data Mining, AI, etc)	1.6%	11.5%	21.3%	34.4%	31.1%	3.82	61	1.06
The company invests in bringing in the latest technologies so that it is the leader in its field, which enables it to take over the market and is not affiliated with others.	4.9%	6.6%	13.1%	39.3%	36.1%	3.95	61	1.10
The company adopts and follows the approved standards and regulations in information security to protect the data of the company and its subscribers	0.0%	3.3%	16.4%	39.3%	41.0%	4.18	61	0.83
The company relies heavily on the use of technology and communications to develop cooperation between different departments and transfer knowledge in the company, which facilitates the process of digital transformation.	0.0%	3.3%	13.1%	41.0%	42.6%	4.23	61	0.80
The company owns the technologies and devices (Hardware, and Software) that reduce the cost of automation and digital transformation.	1.6%	4.9%	14.8%	54.1%	24.6%	3.95	61	0.86
Using technology for digital transformation	0.0%	6.6%	11.5%	44.3%	37.7%	3.97	61	0.75

Respondents feedback on value creation and new products:

Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	N	Std. Deviation
The company has digital communication with its customers and subscribers	0.0%	3.3%	16.4%	34.4%	45.9%	4.23	61	0.84
The company continuously and regularly monitors the external market and technical development to identify new patterns of business development and exploitation of opportunities	3.3%	4.9%	16.4%	41.0%	34.4%	3.98	61	1.01
The company consults external partners (suppliers, business partners, customers) in the development of digital products and services	3.3%	9.8%	14.8%	37.7%	34.4%	3.90	61	1.09
The company scientifically and continuously analyzes the digitally collected data in order to develop new products and services	4.9%	6.6%	16.4%	44.3%	27.9%	3.84	61	1.07
The company fully supports its products and services with digital and smart offers to facilitate its customers	3.3%	8.2%	16.4%	34.4%	37.7%	3.95	61	1.09
The company analyzes the needs of its customers and works to develop services and products for each customer in line with their requirements	1.6%	8.2%	9.8%	36.1%	44.3%	4.13	61	1.01
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	0.0%	8.2%	9.8%	37.7%	44.3%	4.01	61	0.79

Respondents feedback on structural and procedure organization change:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	N	Std. Deviation
Senior management greatly supports and leads the company's digital transformation process	0.0%	3.3%	19.7%	39.3%	37.7%	4.11	61	0.84
The company's employees have a positive attitude towards the digital transformation process and the resulting changes	0.0%	3.3%	18.0%	45.9%	32.8%	4.08	61	0.80
Employees are informed of the company's digital transformation activities in order to serve the direction and achieve the goal	1.6%	1.6%	14.8%	55.7%	26.2%	4.03	61	0.80
The company plans to add a separate unit management, especially for the new digital transformation operations	13.1%	26.2%	14.8%	26.2%	19.7%	3.13	61	1.36
The company makes great use of new methods of work that contribute to the flexibility of doing business for the organization by relying on modern digital technologies	0.0%	3.3%	26.2%	39.3%	31.1%	3.98	61	0.85
The company periodically reviews work procedures and works to develop them using digital technologies to increase their flexibility	0.0%	4.9%	23.0%	34.4%	37.7%	4.05	61	0.90
The company uses digital forms continuously to plan, design and monitor the procedures for the company's work, which contributes to the distribution of roles and responsibilities in the organization	0.0%	13.1%	26.2%	32.8%	27.9%	3.75	61	1.01
The professional competencies of employees are matched, which contributes to overcoming the challenges of digital transformation in the company	0.0%	9.8%	26.2%	39.3%	24.6%	3.79	61	0.93
The company bases its employee performance assessment on their digital competencies to be able to quickly deal with the changing needs of digital transformation	3.3%	8.2%	29.5%	39.3%	19.7%	3.64	61	1.00
The company provides the necessary training and education programs for employees to increase their skills in dealing with the latest developments in digital technologies	3.3%	13.1%	21.3%	32.8%	29.5%	3.72	61	1.13
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	0.0%	1.6%	23.0%	47.5%	27.9%	3.83	61	0.68

Respondents feedback on financial aspects:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	N	Std. Deviation
The company considers modern digital technologies an opportunity to enhance its financial position	0.0%	1.6%	18.0%	37.7%	42.6%	4.21	61	0.80
The financial position of the company allows the implementation of the digital transformation process	3.3%	1.6%	24.6%	34.4%	36.1%	3.98	61	0.99
The company invests part of its money in modern digital solutions that develop the existing technical infrastructure of the company	3.3%	1.6%	26.2%	36.1%	32.8%	3.93	61	0.98
The company's senior management financially supports the digital transformation of the company	3.3%	3.3%	19.7%	39.3%	34.4%	3.98	61	0.99
The company's financial readiness and ability in the digital transformation process.	1.6%	3.3%	11.5%	36.1%	47.5%	4.03	61	0.78

Spearman's rho Correlation Results:

Correlations							
			Using technology for digital transformation	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	The company's financial readiness and ability in the digital transformation process.	All Components
Spearman's rho	Using technology for digital transformation	Correlation Coefficient	1.000	.654**	.657**	.616**	.833**
		Sig. (2-tailed)		.000	.000	.000	.000
		N	61	61	61	61	61
	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	Correlation Coefficient	.654**	1.000	.713**	.607**	.839**
		Sig. (2-tailed)	.000		.000	.000	.000
		N	61	61	61	61	61
	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	Correlation Coefficient	.657**	.713**	1.000	.811**	.936**
		Sig. (2-tailed)	.000	.000		.000	.000
		N	61	61	61	61	61
	The company's financial readiness and ability in the digital transformation process.	Correlation Coefficient	.616**	.607**	.811**	1.000	.849**
		Sig. (2-tailed)	.000	.000	.000		.000
		N	61	61	61	61	61
	All Components	Correlation Coefficient	.833**	.839**	.936**	.849**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	
		N	61	61	61	61	61

Control Variables Test Results:

Ranks			
The sector in which the company operates:		N	Mean Rank
Using technology for digital transformation	Telecom Sector	9	32.83
	Internet Service Provider	8	25.81
	Software Development	20	33.13
	Information & Communication Technology - ICT	15	31.53
	Other fields	9	28.17
	Total	61	
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	Telecom Sector	9	35.39
	Internet Service Provider	8	23.19
	Software Development	20	33.50
	Information & Communication Technology - ICT	15	31.43
	Other fields	9	27.28
	Total	61	
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	Telecom Sector	9	35.39
	Internet Service Provider	8	23.63
	Software Development	20	32.35
	Information & Communication Technology - ICT	15	34.77
	Other fields	9	23.89
	Total	61	
The company's financial readiness and ability in the digital transformation process.	Telecom Sector	9	33.50
	Internet Service Provider	8	23.25
	Software Development	20	31.70
	Information & Communication Technology - ICT	15	35.13
	Other fields	9	26.94

	Total	61	
All_Com	Telecom Sector	9	35.28
	Internet Service Provider	8	22.69
	Software Development	20	33.38
	Information & Communication Technology - ICT	15	33.10
	Other fields	9	25.33
	Total	61	

Test Statistics ^{a,b}					
	Using technology for digital transformation	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	The company's financial readiness and ability in the digital transformation process.	All_Com
Chi-Square	1.316	2.928	4.181	3.065	3.766
df	4	4	4	4	4
Asymp. Sig.	.859	.570	.382	.547	.439
a. Kruskal Wallis Test					
b. Grouping Variable: The company size in terms of the number of employees:					

Ranks			
The company size in terms of the number of employees:		N	Mean Rank
Using technology for digital transformation	Less than 10 employees	10	17.55
	10-49 employees	22	30.07
	50-500 employees	21	34.48
	More than 500 employees	8	41.25
	Total	61	
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	Less than 10 employees	10	17.90
	10-49 employees	22	33.57
	50-500 employees	21	31.45
	More than 500 employees	8	39.13
	Total	61	
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	Less than 10 employees	10	18.85
	10-49 employees	22	33.30
	50-500 employees	21	32.55
	More than 500 employees	8	35.81
	Total	61	
The company's financial readiness and ability in the digital transformation process.	Less than 10 employees	10	19.75
	10-49 employees	22	29.80
	50-500 employees	21	33.45
	More than 500 employees	8	41.94
	Total	61	
All_Com	Less than 10 employees	10	16.20
	10-49 employees	22	31.68
	50-500 employees	21	33.88
	More than 500 employees	8	40.06
	Total	61	

Test Statistics ^{a,b}					
	Using technology for digital transformation	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	The company's financial readiness and ability in the digital transformation process.	All_Com
Chi-Square	9.325	7.667	5.821	7.674	9.631
df	3	3	3	3	3
Asymp. Sig.	.025	.053	.121	.053	.022
a. Kruskal Wallis Test					
b. Grouping Variable: The company size in terms of the number of employees:					

Ranks			
The areas in which the company provides its services		N	Mean Rank
Using technology for digital transformation	West Bank	10	21.35
	West Bank and Gaza Strip	21	29.86
	Palestine, including the territories occupied in 1948	7	31.29
	Palestine and foreign countries	23	36.15
	Total	61	
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	West Bank	10	21.25
	West Bank and Gaza Strip	21	28.67
	Palestine, including the territories occupied in 1948	7	27.43
	Palestine and foreign countries	23	38.46
	Total	61	
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	West Bank	10	22.75
	West Bank and Gaza Strip	21	30.81
	Palestine, including the territories occupied in 1948	7	26.36
	Palestine and foreign countries	23	36.17
	Total	61	
The company's financial readiness and ability in the digital transformation process.	West Bank	10	23.25
	West Bank and Gaza Strip	21	30.07
	Palestine, including the territories occupied in 1948	7	30.14
	Palestine and foreign countries	23	35.48
	Total	61	
All_Com	West Bank	10	21.05
	West Bank and Gaza Strip	21	29.88
	Palestine, including the territories occupied in 1948	7	27.86
	Palestine and foreign countries	23	37.30
	Total	61	

Test Statistics^{a,b}					
	Using technology for digital transformation	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	The company's financial readiness and ability in the digital transformation process.	All_Com
Chi-Square	5.009	7.793	4.612	3.498	6.352
df	3	3	3	3	3
Asymp. Sig.	.171	.050	.203	.321	.096
a. Kruskal Wallis Test					
b. Grouping Variable: The areas in which the company provides its services					

Ranks				
Does the company include a department for information technology management:		N	Mean Rank	Sum of Ranks
Using technology for digital transformation	Yes	52	33.94	1765.00
	No	9	14.00	126.00
	Total	61		
Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	Yes	52	32.99	1715.50
	No	9	19.50	175.50
	Total	61		
The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	Yes	52	32.48	1689.00
	No	9	22.44	202.00
	Total	61		
The company's financial readiness and ability in the digital transformation process.	Yes	52	31.94	1661.00
	No	9	25.56	230.00
	Total	61		
All_Com	Yes	52	33.18	1725.50
	No	9	18.39	165.50
	Total	61		

Test Statistics ^a					
	Using technology for digital transformation	Measuring the organization's ability and readiness to create marketing value and products from digital transformation.	The institution's readiness to structure and change procedures in line with the institution's digital transformation process.	The company's financial readiness and ability in the digital transformation process.	All_Com
Mann-Whitney U	81.000	130.500	157.000	185.000	120.500
Wilcoxon W	126.000	175.500	202.000	230.000	165.500
Z	-3.120	-2.115	-1.569	-1.004	-2.310
Asymp. Sig. (2-tailed)	.002	.034	.117	.315	.021
a. Grouping Variable: Does the company include a department for information technology management:					



جامعة النجاح الوطنية
كلية الدراسات العليا

بحث واستكشاف مدى جاهزية مؤسسات التكنولوجيا في فلسطين لعملية التحول الرقمي

إعداد

أيمن مرواح نمر أبو منصور (حمارشة)

إشراف

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قدمت هذه الأطروحة استكمالاً لمتطلبات الحصول على درجة الماجستير في الإدارة الهندسية، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس - فلسطين.

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الملخص

الخلفية النظرية: يتبين من عملية التحول الرقمي في التغييرات التي تحدث في المجتمع ومدى تأثيرها على شتى مجالات الحياة. ولذلك أصبح موضوع التحول الرقمي ودراسته من اهم المواضيع في العقد الأخير لدى كلا من الاكاديميين والشركات الاستشارية وهذا يعود الى حجم النمو الضخم في التقنيات الرقمية. وقد أدى هذا التطور القيادات واصحاب المناصب الادارية الى ادراك مدى اهمية التحول الرقمي وحاجتهم اليه في مؤسساتهم من أجل الحفاظ عليها واستغلال الفرص الجديدة، واكتساب ميزة تنافسية عن منافسيهم، زيادة ارباح مؤسساتهم، واخيراً لتحقيق الخدمة الامثل والايسر لزيائهم.

في المقابل فان عملية تطبيق التحول الرقمي في المؤسسات قد يواجه بالعديد من المشاكل والتحديات والتي قد تؤدي الى خطر الفشل في تطبيق التحول الرقمي. ومن اجل التقليل من هذه المخاطر فلا بد بالمرحلة الاولى من تقييم وقياس مدى جاهزية المؤسسات لعملية التحول الرقمي المنشودة.

الهدف: في فلسطين فإن قطاع تكنولوجيا المعلومات والاتصالات قد شهد نموا واضحا، كما ان نسبة اختراق التقنية والتكنولوجيا في المجتمع الفلسطيني من حيث استخدام الهواتف الذكية والاشترك بخدمة الانترنت تعتبر من النسب العالية، إضافة الى اهتمام الحكومة ممثل بوزارة الاتصالات وتكنولوجيا المعلومات ووضع التحول الرقمي على رأس اولوياتها من أجل التطوير والتعزيز الشامل للخدمات الحكومية الالكترونية المقدمة للمواطنين مما يسهل عليهم الكثير في ظل وضع الاحتلال. ولكن هذه العوامل المباشرة تواجه بفجوة كبيرة على مستوى الدراسات العلمية والأكاديمية والتي تتناول موضوع التحول الرقمي في

فلسطين ومن هنا أتى أهمية هذه الدراسة والتي تهدف إلى التقليل من هذه الفجوة، بالإضافة إلى تقييم وقياس مدى جاهزية المؤسسات الفلسطينية العاملة في قطاع تكنولوجيا المعلومات والاتصالات لعملية التحول الرقمي باعتبار هذا القطاع حجر الأساس في عملية التحول الرقمي وأنه إذا كان جاهزاً فإن أي قطاع آخر في فلسطين يستطيع الاعتماد عليه و اللحاق به.

الطريقة: ومن أجل تحقيق هدف الدراسة فقد تم اعتماد إطار نظري منشور في المجالات العلمية و معتمد في عملية قياس مدى جاهزية المؤسسات للتحول الرقمي وهو (إطار التحول الرقمي)، والذي يعتمد بشكل رئيس على قياس اربع عوامل رئيسة ومؤثرة في عمل الشركات والتي تتلخص بما يلي: عامل استخدام التقنية في المؤسسات، وعامل خلق قيم تسويقية ومنتجات جديدة بالاعتماد على التقنية، وعامل هيكله المؤسسة ادارية واجرائية، واخيرا العامل المالي يتمثل بوضع الشركة المالي. وقد تم اعتماد منهجية كمية من خلال تحضير استبانة تحتوي على 27 بند لدراسة وجمع بيانات عن العوامل الاربعة المختلفة، وقد تم اعتماد عينة الاستبانة لتكون من القيادات العليا او اصحاب القرار في المؤسسات المستهدفة من الاستبيان وهم شراكات الاتصالات، شركات تكنولوجيا المعلومات، مزودي خدمة الانترنت، ومطوري البرامج. و من أجل التحقق من صحة نتائج الاستبيان ولعكس الواقع الفلسطيني السياسي والاقتصادي وتأثيره على عملية التحول الرقمي فقد تم إجراء مقابلات من أشخاص ذوي خبرة في مجال التحول الرقمي ويعملون في مواقع حساسة وخبراء في شركاتهم.

النتائج: وقد اظهرت النتائج من الاختبارات الاحصائية على البيانات المجمعة ان المؤسسات المستهدفة في الدراسة قادرة و جاهزة لعملية التحول الرقمي بناءً على العوامل الاربعة، فقد اظهرت النتائج علاقة ارتباط كبيرة بين العوامل فيما بعضها وبين العوامل والهدف الرئيسي وهو قياس جاهزية المؤسسات للتحول الرقمي.

الخلاصة: وهذا يؤدي الى نتيجة مفادها ان المؤسسات الفلسطينية العاملة في قطاع تكنولوجيا المعلومات والاتصالات جاهزة لعملية التحول الرقمي وتمتلك الادوات لنجاح عملية التحول. ان مخرجات هذه الدراسة ونتائجها تمثل أساس لدراسات علمية واكاديمية تعنى بالتحول الرقمي في فلسطين، وقد تعتبر مرجعا للمؤسسات الفلسطينية المختلفة عند دراستها موضوع التحول الرقمي.

الكلمات المفتاحية: التحول الرقمي، تكنولوجيا الاتصالات والمعلومات، نماذج الجاهزية، إطار التحول الرقمي، إبداع وخلق القيمة، الجوانب المالية، الهيكل التنظيمي وإجراءات المؤسسة.